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FEBRUARY 2006

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FEBRUARY 2006



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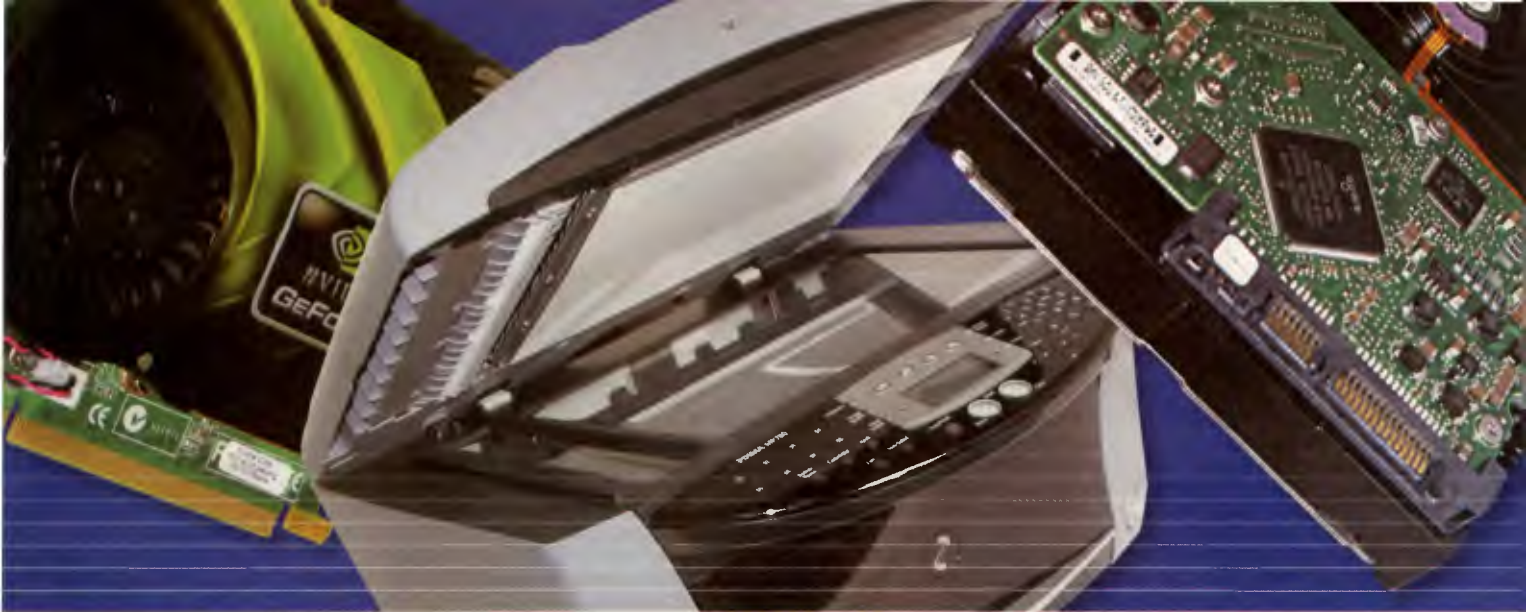
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Coverdisc

FEBRUARY



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Editorial

TONY SARNO



I'm thrilled that the upcoming Blu-ray vs HD-DVD death battle will eventually give us discs with capacities of 50GB. There's only two problems: one, I'm probably going to have to spend my annual holidays shifting all the data I've stored on CDs and DVDs to the new media; two, Simon Sharwood's story on the future of the DVD (see page 88) got me thinking about the issue of reading data from old computer media. I have accumulated hundreds of hours of digital movies over the years, largely from testing all kinds of video cameras. Some original footage is on Digital8, most on MiniDV, some on DVCAM, and even some on High-Definition MiniDV (I recently gave Sony's HDRHC1 high-definition camcorder a test run at a school rugby match). After every shoot, I transfer the video from tape to a more easily accessible media, normally just capturing the footage in its raw DV format and burning it onto discs for later editing. When you consider that one hour of raw DV footage is about 10GB, you can imagine how many CDs, and then DVDs, I've had to burn over the years. Now, much to my horror, many of the original CDs are failing. The files just won't play. We're not talking about data stored on ancient tape drives from 1970s VAX computers, but branded CDs sold in retail five years ago which I've stored in a dark basement. Sure, there's some issues with some of the early codecs I used — before settling on just raw DV — but mostly it's physical: the discs are rotting. I've salvaged most video from the earliest discs

and transferred it to DVD, but chances are that when the standard PC comes with Blu-ray or HD-DVD drives, it probably won't play many of my DVD discs despite the expected assurances of backwards compatibility. I've had enough. For my next mass media migration, I'm going to avoid plastic media altogether and shift everything to external hard disks or one of the new category of home network servers. Hard disk storage is going to get bigger and cheaper, and it means that whenever I want to edit a video, I can find it instantly in the collection anyway.

Speaking of Blu-ray, it's amazing how much has changed in just one year of APC. In this issue, we cover ADSL2+ broadband, we review QoS (Quality of Service) VoIP routers, and do a roundup of HDTV-ready flat panel TVs. Most of these technologies were not easily available or affordable this time last year. Superfast ADSL2+ was yet to be launched by any ISP and 1500Kbits/s was the fastest consumer plan you could get. Plus, a VoIP call still sounded like a discussion in an echo chamber. Since then, ADSL2+ has launched with theoretical speeds of 24,000Kbits/s; the arrival of QoS routers has meant that voice packet traffic is prioritised for good voice quality; and, if you're building a home theatre, HDTV flat panel TVs are now becoming affordable.

For us technology tragics, it just gets better and better.

It's amazing how much has changed in just one year of APC

STAFF FILE

Name: Chris Zammit **Age:** 32 **APC job:** Art Director **Interests:** Playing with the kids and doing shonky DIY **Favourite movie character:** Would have to be Lloyd Bridges in the *Hot Shots* movies **Dream job:** Would love to do film FX.

Born and raised in Western Sydney, Chris began his working life with a variety of highly creative jobs, including being a waiter, working in a video shop and selling door-to-door (where he only lasted a month).

But after doing a visual arts course at uni he landed what must be truly, the

world's best job: cruise ship photographer working on liners such as the *Fairstar* and the *Oriana*. Chris got to travel the world for six years and would probably still be sailing the high seas if he hadn't met an adventurous young Englishwoman whom he rapidly brought back to shore in Australia (and married before she came to her senses). Chris re-trained as a designer and became an Art Director on magazines, leading him to APC. He has been redesigning the look and style of the magazine, and as he says, "you ain't seen nothin' yet".



"HP INTEGRITY SERVERS WERE THE MOST EFFECTIVE CHOICE"

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† APC Survey Nov 2003



Bubble, bubble, coil and capacitor trouble.

TROUBLE SIGNS

Possible indications of bad capacitors include:

- Bulging of capacitor tops
- Electrolyte (brown liquid) leaking onto the motherboard
- Frequent system hangs and memory errors, especially if they increase over time

Is your computer leaking acid?

Dell has allocated \$406 million to fix PCs with leaking capacitors, and other PC vendors are facing up to the nightmare, reports *Angus Kidman*.

Leaking capacitor difficulties are becoming more widespread across the PC industry, with a spate of new outbreaks suggesting computer manufacturers still haven't fully come to grips with a problem that can quite literally cause a meltdown on your motherboard.

Electrolytic capacitors are essential to building PCs, helping regulate voltages on motherboards, power supplies, video cards and other devices. Faulty electrolyte fluid within the capacitor can sometimes produce hydrogen and gas bulging, which in turn creates unpredictable PC performance problems — a problem commonly referred to as “bad caps” or “capacitor plague”.

This isn't a new issue, with the earliest plague reports dating back to 1999. There are even entire Web sites devoted to the issue, such as

<http://badcaps.net>, which offers advice on repairing systems plagued by faulty capacitors.

But the problem has become more visible in current months. Apple, Dell and HP are among the companies with recent models that have been affected. Dell cited capacitor issues as a contributor to a recent profit downgrade, putting aside US\$300 million to help fix damaged machines.

One widespread theory suggests that the leaking capacitor problem is originally the result of botched industrial espionage. According to the theory, which is hyped heavily on badcaps.net (and was reported by the IEEE's newsletter in 2003), a Japanese scientist stole a new electrolyte formula and passed it on to Taiwanese manufacturers. However, the stolen formula was

not complete and as a result, millions of dodgy capacitors were released to the market. (The hyper-paranoid version of the theory also posits that manufacturers continue to knowingly use the dud capacitors as this ensures planned obsolescence.)

While it may be a partial explanation, actual evidence for the theft scenario is somewhat lacking. At least some capacitor problems are believed to be the result of over-filling, rather than dunderheaded chemical burglary.

Faulty capacitors can be replaced, but this isn't a task for those scared of soldering irons. Many owners find it simpler to replace the entire offending component, or demand a replacement from the machine's manufacturer.

Group buys take off

Big computer company, say “hello” to big group of prospective buyers.

A new Australian Web site has been launched to coordinate discount-priced group buys of electronic hardware.

As reported in APC (October 2005, page 11), tech enthusiasts have been pooling buying power to get extremely cheap prices on hardware, such as Dell 24in LCD monitors for \$1,079.

However, informal group buys are difficult to coordinate and rely on trust between users of online forums.

A new Web site, www.grouper.com.au, aims to make it easier for people interested in buying popular (but expensive) hardware items as group buys.

It negotiates special pricing on bulk purchases with distributors and advertises the quantity thresholds groups will have to meet in order to qualify for each discount tier.

At the time of writing, Toshiba Tecra M3 laptops with an RRP of \$2,499 could be

purchased as part of a 25-person group buy for \$1,999 — \$50 cheaper than the cheapest retailer APC could find through a www.staticice.com.au search.

Dan Warne.

Grouper.com.au's Robert Gaunt and Marieke Vollebregt want to trim the fat from retail prices.



in brief

SONY'S ROOTKIT

Microsoft has declared that DRM software distributed by Sony BMG on some of its music CDs, is a rootkit that patches the Windows OS kernel and exposes the PC to serious security risks. After consumer uproar, Sony BMG withdrew the CDs and is now facing class action lawsuits in the US. Sony BMG Australia says the discs were not distributed here. If you used one of the affected CDs, Windows Anti-spyware will detect and delete the software.



SPYWARE TRICKS GOOGLE

If you like to post in online forums, you should check that your forum user profile hasn't been surreptitiously updated by spyware that could be running on your machine. One piece of spyware has been updating people's forum profile homepage details to www.freeloadmp3.com in an attempt to boost Google's page rank of that site.

WINDOWS TO GET DEFENDER

Microsoft's free Anti-spyware software has been renamed "Windows Defender" and will be incorporated into Windows Vista. Signature updates will now be installed automatically by Windows Update. Defender will also now detect and fix rootkits. Microsoft boss Bill Gates announced at RSA2005 that legal users of XP will continue to get Defender free.

Man convicted based on



Clearing his browser cache did nothing to hide his tracks, Angus Kidman reports.

A US man has been convicted of murder based on his Google search history, which included "snap", "neck" and "body decomposition." Robert Petrick was found guilty of murdering his wife Janine Sutphen in November 2005. The prosecution tendered Petrick's Google search history as evidence to prove motive in the case.

The case has revived fears among Internet users that information collected by the search giant could be used against them. But it's not just murderers who are worried, it's people who've googled for pirated software, porn, ways to minimise tax obligations, or information about terrorism.

Google's Personalized Search service sorts results based on previous queries to provide more relevant search results for individual users and an online search history accessible from multiple machines.

The trade-off is that Google keeps a detailed record of your search activities on its servers. Google's privacy policy makes it clear that it collects large amounts of personal data (including logs of site visits and search terms) and stores cookies on individual PCs.

Guarding online privacy can be tricky. Dominant browser Internet Explorer allows users to block

cookies based on broadly defined policies, but doesn't allow site-by-site control. Most users just accept all cookies.

Firefox 1.5 includes more granular security options, but there are still enough concerned Internet surfers to ensure a booming market in third-party software for cookie management.

Google argues users have adequate protection when using the service. "We continue to take proactive steps to protect user privacy and give users control of their personal data," its announcement noted.

Angus Kidman

Microsoft caves in to pressure

Microsoft has announced it will open its Office document formats to competitors, reports Tim Gaden.

Details of Word, Excel and PowerPoint file formats will be submitted to ECMA, an international standards body, who will develop and make the information available to the industry.

The move comes as pressure for greater platform inter-operability increases on the software giant. The State of Massachusetts announced last year that it would adopt the Open Document format, dropping Office because it did not want to see its information shackled to a particular proprietary format. Other US states are expected to follow suit.

The French Tax Office has also cut itself loose from Microsoft's Office format, migrating 80,000 desktops to OpenOffice, which supports the OpenDocument format as its standard, claiming a saving of US\$34 million as a result.

But the strongest pressure on Microsoft to adopt more open standards is coming from the European Commission, which insists all European Union citizens should be able to access electronic government documents without needing to purchase any particular company's software.

Microsoft is meeting this financial and political pressure half-way. It's not committing to the full OpenDocument format,

but is opening up its Open XML format and licence to everyone.

Jean Paoli, senior director of XML Architecture at Microsoft, claims that Microsoft is taking a significant step. The royalty-free licence that accompanies Office Open XML will allow "any customer or technology provider to use the file formats in its own systems without financial consideration to Microsoft." The information distributed by ECMA will allow "public and private-sector customers, technology providers and developers around the globe to work with the Office Open XML formats without barriers, with or without Microsoft products."

Greasemonkey

gives users the power



5 Greasemonkey scripts

GRAB THEM FROM:

<http://userscripts.org/>

1 ROTATING PUFF BEGONE

Remove the rotating "puff piece" story box and advertisements from *The Sydney Morning Herald* and *The Age's* Web sites — so you get news, not ads.

2 GMAIL DELETE BUTTON

Add a delete button to Gmail's Web mail interface, giving you more control over your email than Google thought (or chose) to provide itself. (The <http://userscripts.org> site contains many other Greasemonkey scripts to enhance your Gmail experience.)

3 YOURMOVIES IMDB RATING

Add IMDB star ratings to the movie time listings on www.yourmovies.com.au, making it easy to pick the best option for your Saturday night.

4 LINKIFY PLUS

Turn plain text URLs on Web pages into clickable links. With this installed, anything you should be able to click on, you can.

5 PLATYPUS

Make your own Greasemonkey scripts by modifying any Web site you visit through your Web browser. (This one's available from <http://platypus.mozdev.org/>.)

Don't like the way a Web site works? Just change it, says Tim Gaden.

A popular new browser plug-in is shifting the balance of Web-browsing power away from Web developers by allowing users to modify the content and look of Web pages to suit their own needs.

The Greasemonkey plug-in, designed for the open source browser Firefox, works by managing multiple scripts that change the content and appearance of Web pages "on the fly". Users can remove banner ads from pages, add the Google search box to the Yahoo! home page, fix rendering bugs that the developers won't fix themselves, force Gmail to use a secure connection, or modify the look of online forums and discussion boards for easier use (see "Top 5 Greasemonkey scripts", left, for more examples).

Greasemonkey and its scripts are written in JavaScript. When a Web page is loading, Greasemonkey's scripts are launched and make their modifications while Firefox is rendering the page. Because JavaScript is largely platform-independent, Greasemonkey scripts will often run equally well in PC, Linux and Mac builds of Firefox.

While users are enjoying the new power that Greasemonkey offers, Web developers are frustrated that they no longer control the look (or even the content) of their pages.

In some cases, a Greasemonkey script is so popular that it puts a significant extra load on a site's servers. Users of [yourMovies.com.au](http://yourmovies.com.au) were annoyed at the extra clicks required to get to the IMDB star rating for each film. So John Plsek, an IT consultant

in Lake Macquarie, NSW, wrote a Greasemonkey script that fetched the star rating for each movie in a user's search results and displayed it automatically.

Users loved the convenience, but the script was making [yourMovies.com.au](http://yourmovies.com.au)'s servers work overtime, forcing an extra page request for every search result. Eventually, the owners were forced to redesign the site, making the ratings more easily accessible to the script's users.

The redesign of [yourMovies.com.au](http://yourmovies.com.au) is a clear demonstration of the increased power that users now wield. Web development firms and Web site owners can no longer ignore end-user requests for changes to the look, feel and functionality of sites, because Greasemonkey gives users the ability to make the changes themselves.

The Greasemonkey plug-in is available from <http://greasemonkey.mozdev.org/>.



decode



ViiV

What is it? "Centrino for the living room" — Intel's new platform for media centre PCs. It's a low-power dual-core Pentium M, a TPM chip for DRM security, remote control and wireless chip.

Should you care? Yes. Intel promises it will be "bigger than Centrino" with Intel's biggest marketing campaign ever.

APC verdict: Intel is trying to push other manufacturers out of the media centre PC platform by rebranding the wheel.

John Gillooly



SILENT PODCAST

Dotcom guys have come up with a lot of stupid ideas, but the silent podcast (www.silentpodcast.com) takes the cake. The site promises pure digital silence that can be loaded onto your iPod. A pair of noise-cancelling headphones would work better, but as they point out on the site, silence is completely free. Now that we think about it, it's not nearly as stupid as buying a DRM-encoded track of silence from a certain high profile online music store.

Want to nominate a dumbest moment in tech?

Send an email with the subject line "Dumbest Moments" to dwarne@acpmagazines.com.au. All correspondence becomes the property of APC.





Step up to the plate: Simon's ride was purchased to match his Lian Li.

Extreme geek

A Geek with a gun

Now we're not advocating guns here, but *Simon Woolley* is both an army-trained geek and a relaxed guy who could shoot a few holes in golfers on the weekend if he wanted to.

"You would be hard pressed to find a geekier geek than me," reckons Simon. We can't disagree, nor would we want to. Simon was in the army for 15 years, "shooting real guns, not those namby pamby BF2 ones, but ones with real bullets".

Despite his hardened mercenary façade, Simon's job was the building, maintaining and supporting of computer networks and servers in the field.

"Military geek training helped with setting up LAN parties on

weekends," he said. "First person shooters are the preferred games for a good military geek LAN party. Even if you're in the Army, it's nice to pretend to be a sniper for a few hours."

But such trifles as guns and hardened battlefield computer networks were not enough to qualify Simon for APC Extreme Geek status. We wanted more.

Then Simon dropped the real pearler: he picked his car to match his Lian Li computer case, and fitted

it with a personalised "GEEK" number plate.

This act of unbelievable geekness put him well over the finishing line. But that wasn't all.

Simon disclosed that he tried to put cold cathode neon lights in his car just like his Lian Li computer. "Only problem was I'm not good with electrics and I also found out it was illegal," he lamented.

In his spare time, Simon collects and rebuilds old arcade machines. He has original Golden Axe and

Tekken machines, each with 26in monitors, and a MAME emulator machine with a 21in monitor attached.

Simon declined to say what his current job is except that it is for a shadowy "government organisation", and that he now supports its worldwide computer systems. Simon may well have a dossier on you and me, but we've just done the dossier on him. Simon is officially an APC Extreme Geek.

Dan Warne

HOW GEEKY ARE YOU?

Have you wired up your car? Shared your home media library with five family members in three states? Made a 16 terabyte file server? If you've done something interesting with computing technology, APC wants to hear about it.

Email a description of your project to dwarne@apcmagazines.com.au and include photos (we need at least one of you pictured with your gear!). This month's Extreme Geek wins a digital HD USB TV tuner from Pioneer Computers. The DreamVision Digital TV tuner (\$199 RRP) turns a desktop



PC or notebook into a high-definition digital television receiver which also performs real-time digital video recording, scheduling and time shifting. The tuner supports USB 2.0 (and is also USB 1.1 compatible). More information at www.pioneer.net.au or call (02) 9690 2888.

January's Extreme Geek received a VoIP port Analogue Telephone Adaptor Kit from MyNetFone, which can be used to make and receive phone calls over broadband Internet. The Kit includes a MyNetFone SuperSaver account with \$5 call credit, so January's Extreme Geek will be able connect it up and make phone calls straight away. The MyNetFone VoIP Adaptor retails for \$129. More information at www.mynetfone.com.au or call 1300 731 048.





The new Coolpix P Series with wireless image transfer

The Nikon Coolpix is more than your everyday camera. With a range of easy-to-use features, it helps you take better pictures, more easily. And the new 8MP P1 and 5MP P2 with Wi-Fi technology let you transfer each image to your computer or printer, wirelessly. So nothing will stop you getting a great shot.



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HELP BUTTON

More Fun, More Freedom



exchange

Samsung's Sony crusher

Physicist *David Steel* is the marketing guru behind Samsung's digital media business in Korea. *Dan Warne* quizzed him about Blu-ray.

Is Samsung backing Blu-ray or HD-DVD?

We're very much focused on Blu-ray. We think it's the best technical solution and we really hope that one standard prevails because if there are confusing standards it's just going to inhibit adoption.

What timing do you anticipate for shipping Blu-ray?

We'll start to see products in the first half of 2006. By the second half we should see some decent business in that area.

Will Australia be among the first countries to get Blu-ray?

The issue with Blu-ray is not so much about the technology itself so much as whether high-definition TV broadcasting has taken off in a particular region yet. If there's very little or no HDTV broadcasting, people are unlikely to have high-definition TVs. Blu-ray's main advantage is high-definition video, so for markets that don't

yet have good HD penetration, it's a moot issue. You can buy a Blu-ray player but there would be no point using it with a standard TV.

What about Blu-ray in PCs? Plenty of people have very high-res monitors.

I think that Blu-ray in PCs will come at around the same time because it's being fuelled by the same thing — higher definition video. There is an additional issue in PCs — cost is much more of a pressure point than in the audio-visual market. The PC business is very competitive and to put in a Blu-ray drive that is still very expensive isn't going to fly in the PC space. It will need to be reasonably affordable [for PCs]. We're in a situation where everyone is linked on this... broadcasters with HD content, PC makers with Blu-ray drives, consumer electronics makers with Blu-ray devices and the DVD companies with Blu-ray packaged media.

Could the electronics of a Blu-ray drive eventually be made for the \$40 price that a DVD drive goes for today?

It's hard to say right now. This is something that hasn't even been introduced to the market yet. Once it's introduced and we get an idea of costs and demand, then we will be able to forecast forward for how the costs might come down. But even the cost of the consumer electronics players right now is hard to say. When you're introducing a product that's so new, cost is far more complex than simply the price of the parts.

One other thing... Samsung recently developed a competitor to WiMax called WiBro. Do you think that will win despite the strength of the huge consortium behind WiMax?

It's complementary. I think that's one of the confusions. People are concerned that it's a direct competitor. WiBro

and WiMax share the same underlying common standard, but WiBro is really focused on mobility, while released versions of WiMax are focused on fixed location wireless.

One of the issues in this space is getting to market fast. We just demonstrated WiBro handsets last week in Korea. Infrastructure companies are reluctant to invest unless the mobile devices are available. But device companies don't want to make anything unless the infrastructure is available. It gets caught in a loop. What we wanted to say is "here are the WiBro handsets... they are ready to go." We're taking it beyond a standards debate and getting it into the market.



Serial Port makes a valiant comeback

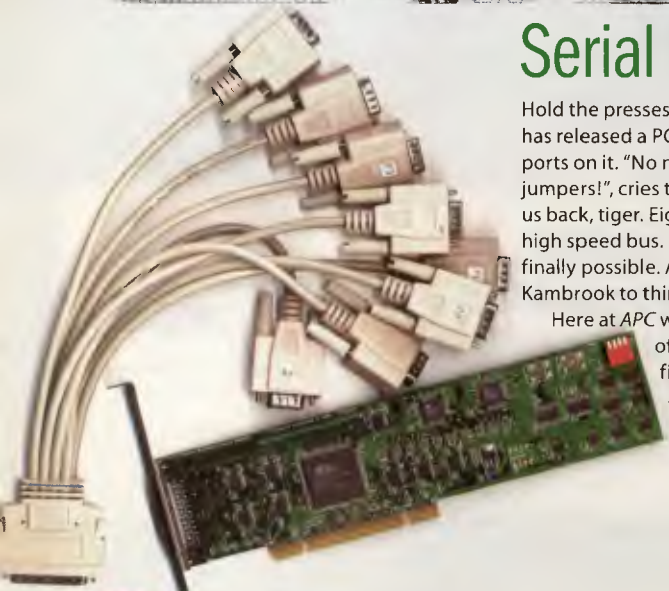
Hold the presses! Australian firm Micronica has released a PCI card with eight RS232 ports on it. "No need for any switches or jumpers!", cries the press release. Hold us back, tiger. Eight serial ports on one high speed bus... we can't believe it's finally possible. And it didn't take Kambrook to think of it.

Here at APC we've put the full resources of the research desk onto finding legitimate uses for an eight-port serial card. Here's what the team has come up with so far...

Dan Warne

TOP 5 USES FOR AN 8-PORT CARD

5. Octopus-men who prefer an original Microsoft serial mouse in each tentacle.
4. People who have given up all hope of getting broadband and can now multiplex eight dial-up modems for a stunning speed of 368Kbit/s (30% faster than Telstra's common 256Kbit/s ADSL speed).
3. Hardware-hacking enthusiasts who need to firmware flash eight devices simul-bloody-taneously.
2. Speed demons who want to network the whole office using the powerful Laplink over Serial Port protocol.
1. Old school techies who want to protest their disgust for the Internet and restart the BBS revolution. Hurrah for AT modem commands!



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quote file

“Everyday consumers shouldn't be treated like copyright pirates, and copyright pirates should not be treated like everyday consumers”

Attorney-General Phillip Ruddock foreshadows improved fair-use rights for ripping CDs to iPods.

“Computer, show pictures of Steve in St Kilda!”

Bladerunner-style face recognition technology is heading for your home PC to sort out your photo library, Simon Sharwood writes.

Parents taking snapshots of their three-year-olds at birthday parties might enjoy capturing the moment, but 18 years down the track (and about 30,000 digital photos later), will they be able to easily dig up those pics to create the fodder for a traditional Aussie 21st birthday photo board?

As the digital photography revolution rolls on, most people are starting to realise that having photos on their hard drive doesn't necessarily make them any easier to find than the old “shoebox in

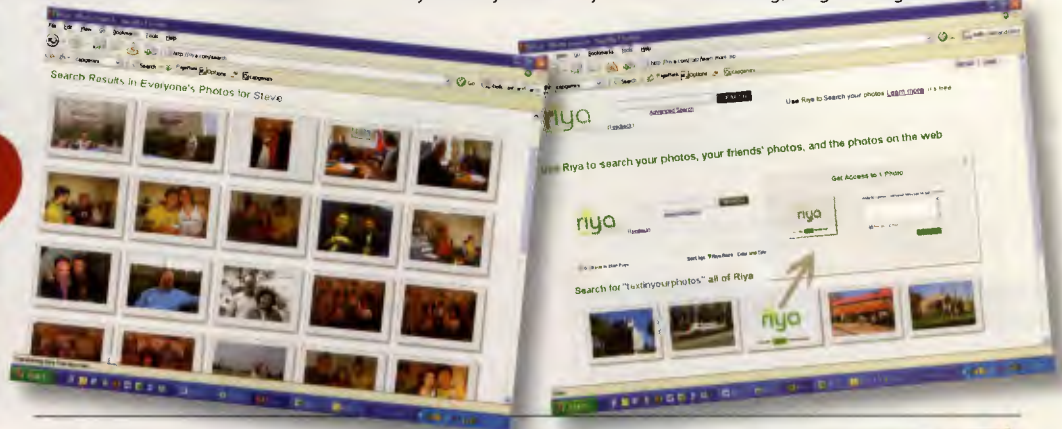
the cupboard” method associated with film photography.

The industry has been working on improving this, with digital camera makers investigating how best to incorporate global positioning systems (GPS) into cameras so the location of photos can be recorded along with the date and time.

Further, new Web site **www.riya.com** (once you've uploaded your photo library) will perform face recognition across your whole library. When you identify

individuals, the software will take care of finding and labelling them in all your pictures.

At the time of writing, the site's software was offered only to a closed group of alpha testers, but a Web-based sample service offers a tantalising glimpse of its power. Operating with a small collection of sample shots, the site lets you type in a search term and then retrieves photos that match it. There are more than 50 variables, including hair and eye colour, clothing, height and gender.



DREAM SYSTEM

The ultimate ute for Geeks

Do you think that utes are just for plumbers, petrol heads and farmers? Think again.

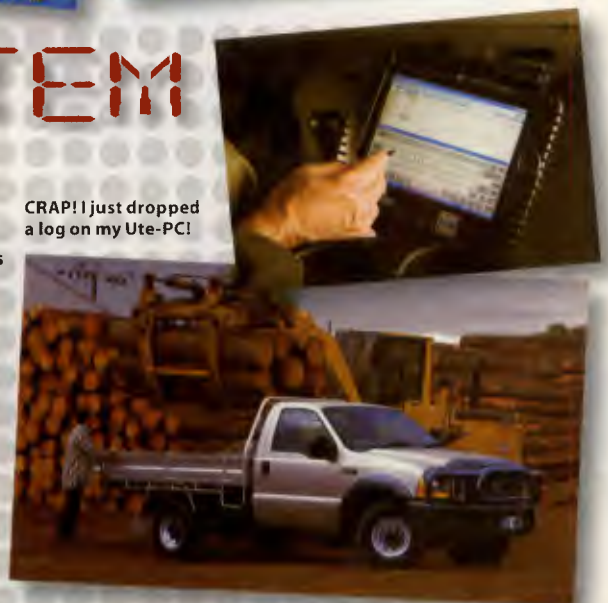
This year, Ford will release a US-only version of its F-250 Super Duty ute that, according to the press release, is “the marriage of ‘Built Ford Tough’ brawn with Microsoft and Stargate Mobile brains.” The first thing that comes into APC's mind is the chilling fear of Microsoft having anything to do with a real-life moving vehicle, immediately followed by the realisation this is a truck with

“Stargate” in its name, which evokes images of ute-driving aliens attacking the world. Cool!

Nonetheless, this is a ute any geek would be proud to own. It comes complete with a wireless touchscreen-equipped computer, printer and global positioning system for the bargain price of \$4,100 on top of the normal price. Ford also offers digital camera and credit card scanner accessories.

Tim Gaden

CRAP!! I just dropped a log on my Ute-PC!



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Franchises for computer services are booming, but they don't necessarily light a sure-fire path to geek wealth, *Angus Kidman* discovers.

As an APC reader, you're probably savvy enough to sort out many of your technical problems yourself. But you're also undoubtedly the regular recipient of phone calls from desperate friends and relatives who have discovered that wireless networking equipment hardly ever works out of the box. It's only natural to wonder if you could turn your talent and enthusiasm for PC technology into a paying job, especially since you could easily run such a business from home with little more than your computer.

A quick glance at the Yellow Pages will reveal thousands of existing operators in its "Computer Equipment — Repairs, Services & Upgrades" category. How on earth are you going to stand out in that crowd? One possibility is to

examine franchising — buying into an established brand name and taking advantage of its support mechanisms and marketing.

Franchising still has a whiff of "pyramid-selling scheme" about it at times, especially as many franchisees are just as keen to make money from selling new franchises (as from servicing customers). However, it's become far more visible and respectable in recent years. The Franchise Council of Australia (FCA) even got PM John Howard to address its national conference (though it's probably no coincidence that he was in hard-sell mode for workplace reform at the time).

"Over the last ten years, there has been an increase from 39,000 to 50,000 in the number of franchise

businesses," Howard proclaimed. "On one estimate, the franchise sector now contributes 10 per cent of Australia's GDP and provides employment to approximately 600,000 Australians."

While the IT sector can't boast a franchise scheme with the ubiquity of Subway or Gloria Jean's, franchisors have been quick to jump on the computing bandwagon. The FCA's Franchise Business Directory lists 11 technology franchise operators, all of whom are keen to sign you up.

Computer Troubleshooters, which operates 82 franchises in Australia and more than 400 overseas, claims to be Australia's largest IT franchisor. Steve Paino, regional director for NSW (and owner-manager, with his wife

Lorraine, of the group's Botany franchise), recalls that it was a challenge to locate new franchisees when he first joined the scheme in 1997 after being made redundant from his job.

"It was very difficult at first, especially in a two-pronged role, running my own franchise and trying to recruit other people," he told APC. "There was much less of an interest in franchising. People were very distrustful of the whole franchising concept. It's a lot easier now. A lot of people want to work for themselves and understand the benefits of the franchising system."

Unfortunately, Paino says uber-geek experience is a less important qualification than it used to be. "It's probably changed a little bit over time. Originally, we looked

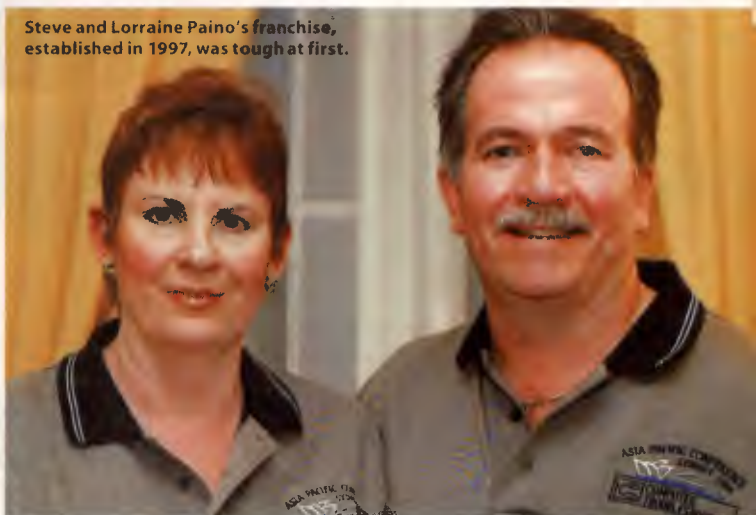
THE COSTS AND THE CHALLENGES

A survey of its members by the Franchise Council of Australia (FCA) highlights both the potential and the pitfalls of running a franchise operation. While 92% said they were happy with their franchise operation, only 71% said they would buy their franchise again. Notably, only 64% were happy with the return on their original franchising investment. The FCA argues that these figures are still much higher than for small business owners in general, but they might give you pause for thought before you chuck in your salaried job. You'll also need a healthy bank balance.

Computer Troubleshooters charges \$24,200 to sign up, and advises having a similar amount of working capital to cover operating expenses while the business grows. Jim's Computer Services charges \$20,000. Even having the money in hand doesn't guarantee you'll score a franchise. "We knock back a lot of people," Penman notes.

Paino says earnings for a franchisee can range from \$80,000 to \$400,000, though businesses in the latter category will invariably have a physical storefront and thus higher basic expenses.

Steve and Lorraine Paino's franchise, established in 1997, was tough at first.



for people who were technologically savvy. Now we look a little bit more for people who are business savvy. The technological knowledge is less important than the ability to communicate well, though you still have to have some kind of technical aptitude."

A similar story emerges from Jim Penman, whose Jim's Group franchising outfit is probably best known for the mowing service he founded in 1982 (but which has also run a computer services division since 2002). "They need a reasonable level of broad technical background but, as much as anything, they need business skills. Our guys need to be good communicators. They also need to talk in a language people can understand," Penman says.

Despite that, it's still simpler to find a potential IT franchisor than a floor sander: "It's one of the easier ones to find franchisees for. It's what people like doing that's important as much as anything else," says Penman. Jim's Computing Services currently has 63 franchisees and 16 franchisors. "It's one of our fastest growing divisions," he says.

While computing uses the same franchising model as applied to the Jim's other numerous divisions, which range from concreting to dog washing (and includes strict training and service requirements), the technology business does have a few quirks of its own.

"Most of our divisions have a huge surplus of work, but computing has to seek it out," Penman says. To build a client base, franchisees are encouraged to

door-knock businesses ("business owners are great clients"), and are offered payments from Jim's for doing so while the business builds. "If they do that, they start picking up work very quickly," Penman says.

Much of that work is likely to be routine. Paino says the most common cause of call-outs is performance problems caused by spyware, followed by network configuration issues. Franchisors can increase their revenues by on-selling additional products and services, though that can blur the lines between servicing and retailing and may require a further capital investment up front.

One aspect that arguably differentiates the tech service business from other franchise models is the continuous training required as new platforms and technologies emerge. However, Penman says the gap between

computing operators and, say, fencing franchisors isn't as vast as you might think. "Any successful business operation requires ongoing training, especially if you want to keep on growing the business."

One obvious advantage of working as part of a franchise is enhanced visibility. "People look differently at branded services," says Penman. "They just do." A practical

consequence, he notes, is that Jim's can charge as much as 15% more for service work and still attract customers.

As PC ownership levels show no signs of decreasing, it seems safe to assume this army of service technicians will continue to grow. As Penman puts it: "If, in five years, I don't have 500 or 1,000 computer service franchisees, I'll be very disappointed." **ENTREPRENEUR**

“IT'S STILL SIMPLER TO FIND A POTENTIAL I.T. FRANCHISOR THAN A FLOOR SANDER: IT'S ONE OF THE EASIER ONES TO FIND FRANCHISEES FOR

— Jim Penman



What a tangled Web they wove

Ten years after the birth of the Web, some of Australia's original Internet gurus recently got together to share their thoughts on the "e" business, past and present.

You wouldn't have found too many grey hairs in Australia's dot com brigades a decade ago, when ambitious entrepreneurs jumped onto the newly created graphical World Wide Web in the hope of making a few quick bucks.

Ten years later, Australia's dot com climate has gone from boom to bust and boom again as online services evolved from novelties to business differentiators to business liabilities and, finally, business as usual. Most of Australia's early Web pioneers have moved on to other

ventures, but a few strong survivors are still making waves online.

To commemorate the tenth anniversary of the Web, marketing company Slattery IT recently brought together nearly two dozen of Australia's dot com pioneers and current bright sparks. With grey

hairs now in abundance, all shared their memories of the Web that was, their observations about the Web that is, and their hopes for the Web that will be. APC was there, and here we share some of their most incisive observations.

David Braue

WAS THEN: Left Optus marketing in 1999 to launch ShopFast.com.au, an online grocery service that he sold to Coles in early 2003.

IS NOW: An executive advisor and CEO of Wishlist Holdings, parent company of Wishlist.com.au, one of Australia's

longest-running e-tailers.

SAID: "At ShopFast we always believed the Internet was no different to any other business. You just had to focus on what was exceptionally boring: understanding who your customers are and how to get them

to the site. It had more of a logistical back end, and could only grow slowly.

WishList was about carving out a new space and getting eyeballs to this completely new position, so it had a far stronger approach to advertising and getting the brand out."

ROB FITZPATRICK



RAMIN MARBANI



WAS THEN: Founded industry analyst www.consult.com in 1995 and sold it to ACNielsen in 2000.

IS NOW: Venture capitalist and consultant with Infrastructure Resource Management.

SAID: "The Internet 1.0 was probably

the only time in history where you could raise capital from the public markets for a business model.

The biggest social impact of the last 10 years has been the percentage of household income spent on telecommunications which has by

far outgrown all other spending. . .

We cannot keep spending an increasing percentage of our budget on telecommunications. Many people don't understand that ARPU [average revenue per user] has to go down, to restore social balance."

WAS THEN: Executive director, Internet Industry Association, a lobby and advisory group representing Internet-related businesses to government.

IS NOW: Amazed he's still doing the same thing ten years later.

SAID: "We have seen that regulation has, if not destroyed nascent industries, certainly impeded their capacity to develop and compete internationally. The datacasting debacle of 2001 could have delivered broadband access to every

Australian who owned a TV set, but was sacrificed to protect commercial TV interests. In some respects, it's almost a miracle we survived, but in others this success represents the sheer power of the [Internet] medium to resist attempts at regulation."

PETER CORONEOS



DAVID GIBBS



WAS THEN: A McKinsey & Company financial services, communication and distribution consultant who founded online mortgage broker eChoice in 1998.

IS NOW: Founder and CEO of dSales, sister company to eChoice, founded in

July 2005 to commercialise eChoice's core processes and disciplines.

SAID: "No one actually changed the rules of business, or how you build a marketplace. We gleefully embarked on the home loans path with the help of venture capital funding, but it took

six months to work out we were in a category where clicking from a list, and dragging and dropping, didn't work.

We'd bitten off a whole challenge: people just won't rock up and buy a home loan online."

WAS THEN: Editor of *The Age's* IT section.

IS NOW: Managing director, Fairfax Online.

SAID: "Newspapers have been on the Web for 10 years. Most major media organisations now have a bigger

audience on the Web than they do traditionally; I know our company does, which is amazing. Print companies offer video online, while TV companies are doing print reporting for their Web sites. The boundaries are blurring.

A tipping point is coming, where there's going to be a major shift in how people consume media. The big challenge is to commercialise it, as the vast majority of revenue still comes from print. What comes next is the interesting and exciting thing."

MIKE VAN NIEKIRK



DOMENIC CAROSA



WAS THEN: Sleeping late, practising for his driver's license, and studying for his VCEs.

IS NOW: CEO of Destra Corporation, which in December 2003 became Australia's first supplier of legal music downloads and now sells

over 500,000 songs through numerous partners.

SAID: "In the early days, the record companies saw the Internet as the Antichrist. Only in the last couple of years, they're starting to realise it's actually their saviour. At Destra

Music, 50% of sales are from back catalogues that the record companies can't physically get into the stores. They might only sell a couple of hundred copies of a track, but it more than makes up for any lost revenue from piracy."

WAS THEN: Co-founder of LookSmart search engine in 1996, a Google competitor now faded into obscurity.

IS NOW: Wishing Google founders Sergey Brin and Larry Page had spent more time studying and less changing the world. Also, a director of seed

funding firm Jellicon.

SAID: "I'm in a state of almost unrelieved gloom. There was a point when LookSmart had a bigger market capitalisation than Qantas, when it could have become a truly global success story.

My despair is not total, however: the tyranny of distance is receding, and Australia can succeed. Great brands will launch from Australia, Japan, China, and Korea to compete head-to-head with all the early brands that came out of California."

MARTIN HOSKING



KEITH ONDARCHIE



WAS THEN: CEO of carrier UeComm, since bought by Optus.

IS NOW: Managing director and CEO of wireless ISP Access Providers.

SAID: "Telstra will spend billions of dollars to protect their network. The best way to overcome Telstra's

position is to provide other services such as wireless. Broadband is the way forward, for consumers and businesses.

VoIP is changing the way people think. When it really takes off, it will be just like what 3 is offering:

data services; unlimited downloads; and voice. 3G is limited, but it will create a new appetite, and WiMAX networks that are available will easily take over the frustrated users of 3G networks, just like we're taking over the frustrated users of ADSL."

WAS THEN: CEO of Web development and online advertising company Selenium Interactive.

IS NOW: CEO of online media planning, company eMitch Limited.

SAID: "We've looked at online almost as a direct marketing tool, but don't

forget its effect branding campaigns. If you're a regular online user under 30 with broadband, currently 38% of your media exposure is online and 32% by TV. Companies can't afford not to deliver their branding messages online: it's where their audience

is. The Internet is powerful [for marketing] because you can measure lots of things. Online advertising is like any advertising: there are usually only three or four things you want to know about the campaign. The trick is to ensure you measure these."

LEE STEPHENS



DAVID SPENCE



WAS THEN: Managing director of fast-growing ISP OzEmail.

IS NOW: Director and CEO with wireless broadband provider Unwired Australia.

SAID: "It would be a real pity if Telstra was able to gobble

up the wireless guys. [With WiMAX, Unwired and related long-distance wireless technologies] we have the first real opportunity in this country to create an alternative local loop. If Telstra were allowed to take up the other alternative

loop it wouldn't be a good situation, and we would have the same situation as in pay TV. This is the one chance we've got to create an alternative local loop."

WAS THEN: Manager with ex-telecoms regulator AusTel before joining Macquarie Telecom in 1997.

IS NOW: Group executive, Carrier & Corporate Affairs, Macquarie Telecom; president of the Asia-Pacific Carriers Coalition, and deputy

chairman of SPAN, the Australian Service Provider's Association.

SAID: "A perfect storm's been happening over the past 18 to 24 months, as applications come to fruition and there's enough broadband to make them work.

The biggest factor will be Telstra's attempt to re-monopolise last-mile access. Fibre to the home is a subtle attempt to isolate the networks rolled out by Macquarie and others so they have to interconnect at the box in the street — not at [Telstra's] exchange."

MAHA KRISHNAPILLAI





SO you want to be a games developer?



Chris Mettzen, VP of Creative Development at Blizzard.



Rob Pardo, Blizzard's VP of Game Design.

APC's Dan Warne asked the designers of one of the world's most successful games, *World of Warcraft*, what it takes to score their job.

"Wow, man, what a ride. I mean, what an amazing ride..."

Chris Mettzen stands on stage, in front of a crowd of transfixed programmers, with the swagger of a rock star, complete with jetlag and a gravelly throat. He has all the trappings of success, all the signs of a Valley Guy made good. Thick designer sunglasses. A studded leather wrist-strap. Black clothes.

He's been flown from America all-expenses-paid to talk at the Australian Game Developers Conference. He's the vice president of Creative Development at Blizzard Entertainment, the game company that has produced hit game after hit game and known jealously for having "endless cash".

But despite the fancy title, Mettzen is just a dude who achieved many a geek's dream: he turned his love for fantasy roleplay gaming into a job and then a highly successful career. Mettzen told APC his recipe for success was simple: hang on tight during the tough times, because there will be tough times.

The pressure-cooker landscape of game development firms forces people to work up to 80-hour weeks in the lead up to the release of a game. Sometimes there's just not enough time: publishers sometimes lay down a deadline by which a game must be released, even if it's simply not ready for prime time. The publisher recoups their initial investment, but the game flops. Blizzard has found itself

AUSTRALIA'S BIG



The Hobbit (1982)
Beam Software (Melbourne)
Australia's most successful game ever; a text-based adventure with very simple graphics that sold over 1,000,000 copies following its release in 1982. It came with a free copy of the *Lord of the Rings* book and was ported to Commodore 64, Sinclair ZX Spectrum, Dragon 32 and Oric.



Ty the Tasmanian Tiger (2002)
Krome Studios (Brisbane)
A platform game for kids where you play a thylacine who has to free its family from the Dreamtime by collecting talismans that will allow them to escape from the evil Boss Cass. Made for PlayStation 2, Xbox and Gamecube. Catchphrase: "No worries mate, we've got boomerangs!"





in the fortunate position of having had such hugely successful games that its publisher and owner, the entertainment giant Vivendi Universal, lets it spend years developing games rather than a typical development period of 12 to 15 months. World of Warcraft took five years to perfect, but Blizzard earned that leeway by producing a string of smash hits including the Diablo, Starcraft and Warcraft series.

TAPPING AUSTRALIAN TALENT

Now, a strange thing is happening: large game development firms, including Blizzard, are turning to the talent pool in the emerging Australian gaming industry.

According to John De Margheriti, organiser of the Australian Game Developers Conference, which was held in Melbourne's Federation Square in December, there are around 800 programmers and artists squirreled away in game development firms around Australia.

Apart from the opportunity to evangelise Blizzard and its

games to an adoring audience at the conference, Blizzard was in Australia on much more exciting business: it was recruiting 50 programmers and artists for its US-based team. It's a massive show of faith in Australian talent.

According to Blizzard VP of Game Design, Rob Pardo, the pay rate's not too shabby, either. Salaries start at US\$40,000 and go up to six figures for "really important key staffers with years of experience". Some studios — normally the more successful ones, Pardo is quick to add — offer profit-sharing schemes to give staff incentive to produce hit games.

PICK A NICHE, ANY NICHE

"It depends what you want to do in the industry, but regardless of what specific field it is, you've got to love games," says Blizzard's Pardo. "If you don't love games, then there are a lot of other careers that people will find more agreeable."

If you want to be an artist, 3D is where it's at, says Mettzen. "We're very interested in recruiting people

who know 3D Studio Max, Maya, and so on. But also, it's a huge benefit just from a conceptual standpoint when a 3D artist can also hand-draw and paint. A strong element of the work is conceptual and we like to have very well-rounded artists." People, whose schoolteachers have thrown up their hands in despair because of a greater love for drawing elaborate comic-book characters, may have good career prospects in the gaming industry, he says.

People aspiring to be game programmers need a solid founding in general programming



AUSTRALIA'S BIGGEST HITS

Freedom Force (2002) Irrational Games (Canberra)

The fate of the world is in your hands in this comic-style superhero game. The Marvel-style graphics frame the landscape in which you use your super powers to defend Patriot City from miscreants.



Powerslide (1998) Ratbag (Adelaide)

A fast and frenzied post-apocalyptic racing game, Powerslide was more than just a homage to Mad Max. It was one of the first games to show off 3D graphics hardware to its full potential, and also a pioneer of multiplayer gaming over TCP/IP.



Dark Reign: The Future of War (1997)

Set on the battlefields of the future, Dark Reign was part of the second wave of real-time strategy games. With it, Auran brought a swathe of innovations to the table, introducing fundamental gameplay concepts that are now commonplace in RTS titles.

**PSST...WANT A JOB?**

A new Sydney game design studio, Team Bondi, is furiously working on developing PlayStation 3 title "L.A. Noire". It already has 44 staff and is currently recruiting artificial intelligence programmers, 3D artists, menu programmers, gameplay programmers, tools programmers, IT system admins, research programmers and 3D animators. To find out more, check out www.teambondi.com.au.

disciplines, but choice of specific language is simple: C++. The whole industry programs in it, according to Pardo. De Margheriti adds that if you don't like maths, don't try game programming: the logic of character movement and complex graphics systems require a strong aptitude for numerical thinking. But, Blizzard's big tip is that there's currently a dearth of people who are good at designing "environmental art". Traditionally, game firms have spent the available graphics

horsepower on rendering characters. Game scenery was often an afterthought, and more often than not, the domain of uninspiring cave walls with simple textures. However, World of Warcraft has shown that scenery can be a spectacular and unique aspect of a game, and producing

stunning environments is now big business. Blizzard is also looking hard for level designers, who set the direction for the artists and the programmers. Even if you can't get into a game design firm right away, there are movie production houses, video editors and graphic design studios dotted around Australia that all do outsourced work for game houses overseas.

GETTING TRAINING

Many Universities now have game design courses, but De Margheriti advises steering clear of six-month-long courses or add-on units to existing computer science courses. Of course, he freely admits to having a biased viewpoint: he founded and runs the dedicated Academy of Interactive Entertainment (www.aie.edu.au), which has campuses in Melbourne and Canberra.

But his logic rings true: do your initial three-year degree honing specific skills in art and design (or programming disciplines in a computer science degree), then do a dedicated game design course to adapt those skills for professional

life in the game industry.

There's also the International Game Designers' Association (www.igda.org) which has Brisbane and Melbourne local chapters and offers advice to individual members on how to get started and progress in their careers.

For anyone who wants to dabble on an amateur level, De Margheriti advises getting into game modding, an excellent way to learn about the architecture of games. And he says to keep an eye on two key Web sites in Australia where game developers converge to discuss and debate: www.bigkid.com.au and www.sumea.com.au. **ERIC**

WoWing the public

When Blizzard launched World of Warcraft (WoW) in late 2004, not even it realised how successful it would be. Within a matter of weeks, it sold the number of copies that Blizzard projected it would sell in a year, to the point that it had to restrict the number of copies being sold to cope with the influx of players, which rapidly began overloading the game servers that Blizzard had set up for the game's launch.

WoW can be best described as the game that has led the second generation of Massively Multiplayer games. It built upon the concept of gamers paying monthly subscriptions to be part of large, "persistent worlds" (sprawling playing fields that never "restart" but continue on in real time until the game is eventually shut down).

Since its launch it has sold over 4 million copies worldwide, with the number of copies sold in Australia sitting close to the 100,000 mark.

Growing out of the venerable series of Warcraft realtime strategy titles from Blizzard, the game takes place in the fictional land of Azeroth. While this setting has its roots in the same Tolkienesque fantasy settings as other role playing franchises, it has distinguished itself with some very different spins on common clichés.

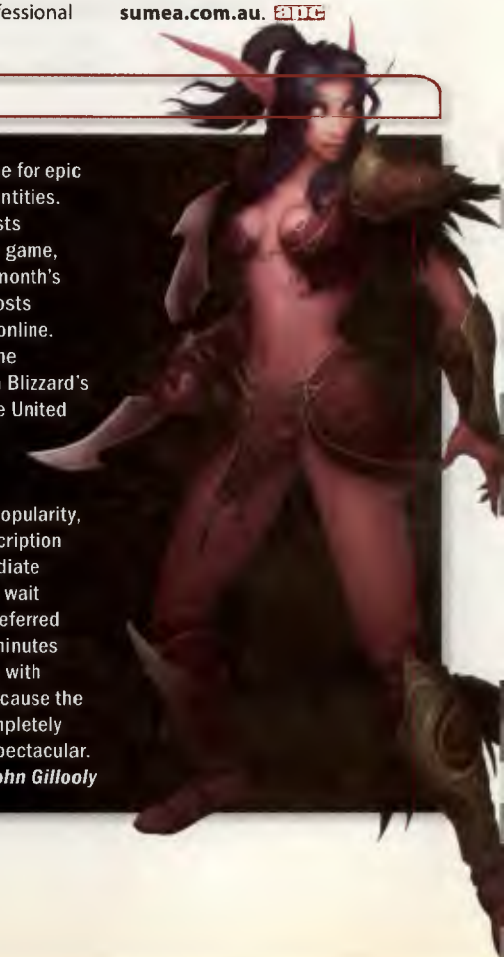
As a player, you can choose to be everything from Dwarves, Orcs or Humans to Tauren. You then take your character through the game, growing in experience and skill, equipping them with better items and facing ever increasing challenges. They can fight against opposing players, play through the game's challenges solo or join

groups of up to 40 people for epic battles against godlike entities.

World of Warcraft costs \$89.95 to buy the boxed game, which includes the first month's gameplay. After that it costs \$39.95 per two months online.

Of course, because the gameplay takes place on Blizzard's centralised servers in the United States, you will need a broadband connection to play, and due to the game's unprecedented popularity, paying the monthly subscription is no guarantee of immediate access — sometimes the wait times to get onto your preferred game server can be 20 minutes or longer. Gamers put up with these inconveniences because the WoW gameplay is so completely absorbing and visually spectacular.

John Gillooly



PowerColor



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- OpenGL® support
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- Windows® Vista Ready



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DUAL DVI

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128-bit

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- 128-bit Memory Bandwidth
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- Microsoft DirectX® 9.0c
- OpenGL® support
- CrossFire™ Ready
- Windows® Vista Ready



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MB GDDR3
128-bit

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- 128-bit Memory Bandwidth
- Shader Model 3.0 support
- Microsoft DirectX® 9.0c
- OpenGL® support
- CrossFire™ Ready
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ReaderAwards2003



DRM – the WTF? technology

The Copyright Act gives you the right to back up software installation discs, but not your CDs, DVDs, MP3s and MP4s. Lawyer Andrew Perry says, “What the...?”

Now that the much-anticipated iTunes (iTunes Music Store) has arrived on Australian shores, you could be forgiven for thinking you can finally be both hi-tech and a law-abiding citizen. Maybe — but only if you're irresponsible!

“The day the music got deleted” (APC January, page 11) highlighted the problems that can arise if you try to make an insurance claim for losing your legal digital music collection, whether through accident, theft or disaster. What it didn't mention was that if you blindly follow one insurer's otherwise sensible advice to keep appropriate backups of your tunes, you may be breaking the law!

While the Copyright Act has been amended to legalise computer program backups,

we are yet to see a similar backup right for digital content, despite the arrival of DRM (that protects authors' rights in backed-up files).

Consumers in the US enjoy relatively broad “fair use” rights to make personal copies of copyright works. Here, the US FTA has so far only delivered increased protection for rights owners — not consumers.

Earlier this year, the Federal Government launched a review titled “An examination of fair use, fair dealing and other exceptions in the Digital Age”; similarly, the House Standing Committee on Legal and Constitutional Affairs has received over 50 submissions on its current “Inquiry into technological protection measures exceptions”

(relevant to issues of backing up DVDs and encrypted games).

We can only hope that these reviews will result in Australians finally getting a right to back up their digital media collections in cases of theft, loss or damage.

In the meantime, you'll have to read your music store's fine print. Subject to playback restrictions, the Australian iTunes Terms of Service allows you to make unlimited copies for personal use, while the BigPond Music Terms and Conditions only entitles you to make copies to up to two of your portable devices operating Windows Media Player 9, and to burn a file up to three times onto CD-R or CD-RW (apparently not DVD+/-R).

On the flipside, the BigPond Music Terms

and Conditions give you a right to download up to two replacement copies of files at no charge if you've had problems installing the file, or your original file is lost or destroyed.

The absurd conclusion to all this is that you can only back up the digital music or media you buy if your music store authorises you, and then only using the technology the music store prescribes. So, if your insurer doesn't cover your digital music collection and your music store doesn't allow you to make backups (or download replacements), if your digital media is stolen, you've blown your dough.

It is time the Copyright Act was amended to give consumers the right to make personal-use backups of their media files on whatever backup media they choose.



Andrew Perry is a Director of legal.consult and President of the NSW Society for Computers and the Law. This article expresses his personal opinions and must not be relied on as legal advice.

InsiderViews

Blu-ray Battle: Microsoft needs to cry uncle

It's plain to see why Microsoft wanted the HD-DVD format for high-definition video discs to triumph over arch rival Sony's Blu-ray alternative, it can be encapsulated in three letters: PS3. But what isn't so clear is why Microsoft is holding fast to what is now a losing proposition? From where I sit, it looks pretty much like game over.

More and more companies, including most of Hollywood (as well as the majority of the porn industry players), are backing Blu-ray.

A few vendors and studios are hedging bets by committing to support both HD-DVD and Blu-ray. But who,

other than Microsoft, is backing HD-DVD only?

Microsoft and its executives are floundering in their attempts to explain why Microsoft won't jump on the Blu-ray bandwagon and persists in its campaign to split the high-definition market.

Gates has gone on record as claiming that Blu-ray will limit flexibility for consumers because of its copy-protection scheme. Yet, at the same time, Microsoft top brass have been reluctant to commit wholeheartedly to HD-DVD with products such as the Xbox 360.

Microsoft hasn't proposed its own alternative high-definition video format.

And it isn't expected to. Instead, its position in the HD-DVD vs Blu-ray battle seems to be “anything but Sony”.

In more tangible terms, Microsoft is probably loath to find itself paying endless royalties to Sony, a competitor in the home entertainment and console gaming space.

Yet, for a company that insists it is listening to customers, this stance is untenable. Microsoft's stubbornness is leading some to waver on purchasing high-definition hardware for fear of betting on the wrong horse. There's no way you can call that pro-consumer.

So what should Microsoft do? Instead of simply admitting defeat, why not claim that Sony has managed to address all concerns (and, if things go wrong later, engage in a major “blame Sony” campaign)? Announce that the Xbox 360 and Windows PCs will eventually support Blu-ray? Turn a concession regarding what's a done deal into a victory?

If Microsoft really wants to curry favour with Hollywood (which it needs to do if it expects to grab a bigger piece of the home entertainment market), calling off a losing battle would sure be a smart place to start. Cry uncle, Bill!



WindowsWatch

Mary Jo Foley is the editor of Microsoft Watch (www.microsoft-watch.com). She sounds off exclusively for APC on Windows each month.

Network wizard

APC's Windows expert, *James Bannan*, looks at the networking capabilities of Windows Vista, Microsoft's successor to XP, due for release in late 2006.

One area of Windows to receive a major overall functionality upgrade in Vista is networking. With the amazing prevalence of broadband and wireless technologies, users are more likely than ever before to be using Windows in a networked environment and homes are more likely to run multi-computer environments with home theatre PCs and networked gaming consoles.

Microsoft has recognised that networking options need to be readily accessible and streamlined, not only for home users (who are now more network-savvy), but also for mobile users who often need to adjust their network settings to adapt to their current infrastructure. So, all the old standards of Windows networking have been bundled into the Network Center — accessible from the system tray. Unlike most things in Vista, the Network Center isn't just a virtual collection of pre-existing apps, but a new feature which ties pre-existing apps together intelligently and easily (adding extra functionality to make it worthwhile). It's also accessible via the Control Panel (in Network and Internet), along with Network Connections and Network Map (brand-new).

All the old Windows 2000 and XP methods of accessing network settings are still there (helping to ease the transition for users of previous versions).

Upon loading, you get an instant visual of which networks you are connected to and which adaptors they make use of. Each network profile is customisable: change the name, change the icon, jump straight into the connection properties or run a



diagnostic if things don't seem to be working properly. And that's just from the main page.

Delving further, you can load saved network profiles and even view a network map. Functionality wasn't that great in the build available at time of writing (5231), but it promises to be an interesting feature to watch, particularly for mobile users connecting to foreign networks (and home users wanting to easily access network resources). It leverages off a new technology introduced by Microsoft called LLTD (Link Layer Topology Discovery). This is a network protocol operating at the same layer as TCP/IP. Some networking devices will be able to support it natively, making them much more visible (and easier to connect to and administer from a Vista-based workstation). D-Link has been the first company to jump on the LLTD bandwagon, promising support in its range of home networking devices like wireless routers and media players. There are a few implications

for this new approach to Windows networking. Firstly, it makes it much more accessible to novice users.

The Network Center resembles high-end network-topology-mapping products used by network administrators; scary to think that it will reside soon on your desktop. There's no denying that it's powerful, designed to give users access to everything they need to know about their local network and all the tools to administer their local machine. PCs are evermore being integrated into the digital home environment, and technologies like LLTD will further this.

For network administrators, the benefits are not so clear-cut. There's a definite opportunity to create customised network profiles for a company's mobile workforce — to make sure that the profiles which correspond to the internal network are fully defined and don't need alteration. Then, users can create their own profiles appropriate to remote networks: client sites, wireless

hotspots or at home. The issue to date has always been how to allow mobile users to seamlessly jump from network to network while maintaining the integrity of their systems and preventing loss of productivity when they get back into the office. As the Network Center creates a new profile for each new network it encounters, this is now possible.

For internal, fixed users however, there's much less benefit. Network settings are clearly defined and are very unlikely to change; certainly not on a day-to-day basis. Bearing this in mind, protocols like LLTD are more of a drawback as they're likely to result in additional network traffic (ie. all the LLTD-enabled Vista machines talking to each other and creating a node map which is being constantly updated). In such an environment, and with little obvious reason to retain it, administrators would be tempted to remove the LLTD protocol and disable the Link Layer service globally.

As great as Vista's networking features are, there is one concern. At some level users need to be aware of the implications of their actions. In the same way that simply enabling Windows Firewall doesn't give you true security, using the Network Center doesn't mean you now know how to network your computer effectively — Vista has made it easier, but hasn't assisted users in becoming more knowledgeable. It would be worthwhile for users to become familiar with Windows networking via the more manual but thorough Windows 2000/XP methods — before moving to the streamlined and all-too-easy ways of Vista. **apc**

HastalaVista



James Bannan is a systems manager at St Leonard's College (Vic) and APC's resident Windows expert. He'll be checking out Vista for you every month.



Cheesy excuses over melted PowerBook

When an Apple PowerBook overheated and melted, Apple said it wouldn't repair it under warranty. Dan Warne investigates.

Dear Watchdog,

On 12 June 2005, I returned from work to find my Apple Mac G4 PowerBook ruined by overheating. I had last used the computer that morning. When finished, I closed the lid to put it into sleep mode and went to work. When I returned to the computer, the keyboard had melted and was fused to the LCD screen. As the plastic cooled, the shrivelled keys dropped off the screen. The hinge joints on the screen were noticeably weakened too, and the lower third of the LCD screen had been blackened.

The PowerBook's heat vents are at the back of the keyboard facing onto the screen hinges and the lower portion of the screen, so the damage suggested the computer had failed to go to sleep and had subsequently overheated.

I purchased Apple's \$500 extended warranty plan when I bought the notebook, so I did not expect there would be any problem with getting the damage repaired. But when I contacted Apple, the customer service people simply didn't get back to me.

I couldn't afford to be without a computer for a long period of time,

so I bought a replacement computer from an Apple dealer at my own expense, and left them with my damaged machine in the expectation it would be repaired, replaced or refunded.

I was stunned when contacted by a technician from the dealer who informed me he believed I had spilled a drink on the keyboard and then tried to dry it with a hair dryer. He actually believed I would have done this to my own computer, to the extent of completely melting the keyboard. I couldn't believe what I was hearing.

I told the technician I was prepared to provide a statutory declaration under penalty of perjury that I had not done so.

Apple was quick to agree with the technician without doing any further first-hand investigation. "You could be correct," they wrote in a reply email to the technician (printed out and supplied to me later by the dealer). "After looking at the pictures, the damage does NOT seem to be a manufacturing defect. This repair cannot be covered under warranty."

The quote for the repair of the damage to the machine totalled

Melted: Apple claimed APC reader Ben Thomas must have done it himself with a hairdryer.

\$5,083.60 — considerably more than buying the top-of-the-line latest model PowerBook.

Had the technician taken the time to investigate the issue more carefully, he would have found a multitude of similar complaints from other Mac notebook owners. They can easily be found with a Google search on relevant keywords such as "melted keyboard PowerBook".

I am astonished that Apple has rejected my warranty claim on pure conjecture by a third-party technician. I can state categorically that no-one in my family spilt anything on the computer, nor was anyone stupid enough to melt the keyboard deliberately with a hairdryer.

**Benjamin Thomas
Ivanhoe, Vic**

Watchdog contacted Apple and invited it to investigate.

Dear Watchdog,

Our findings indicate that this notebook had a residue on the inside, an indication there had been a spill of some kind. Further, none of the internal components of the PowerBook were damaged. Had the

machine overheated from within, there would have been damage done. Tests were conducted using a heat gun from underneath the notebook and above on another keyboard from an identical unit. When heat was applied to the underside, nothing happened. When heat was applied from the top, keys melted and popped off their clips. This provides further evidence that internal heat is not sufficient to damage the keyboard, even if the unit didn't go into sleep mode as the LCD doesn't generate enough heat.

A number of engineers have looked at this machine and all agree the heat damage looks to be a result of an external heat source applied from above, probably in an attempt to dry out a liquid spill.

On this basis a warranty repair was not agreed to.

**Rob Small
Marketing Director
Apple Computer Australia**

We let Ben know the bad news from Apple. He replied: "It's pretty much the same story the dealer gave me. I am concerned that the liquid residue story came



from only one third-party technician who examined the machine and came to his own conclusions. He later admitted these were speculative on his part. One independent guy I talked to agreed the keys could have melted with the lid closed due to the reflected heat bouncing off the LCD screen."

We put Ben's comments to Apple, and asked whether the company would agree to have the unit independently tested by an electronic engineering test centre to establish once and for all whether there was liquid residue and whether the melting could have occurred from the machine's own overheating.

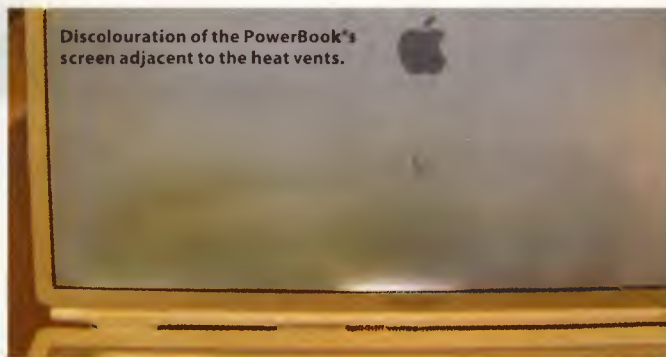
Small responded, "An Apple certified technician examined the machine and took digital photos that were shared with our senior technicians. If Benjamin wants a further examination of the machine, he is welcome to send it in to us, but the fact remains that an Apple certified technician

assessed the machine and determined that there was residue inside. It won't change the outcome of this particular case."

Given Apple's stubborn refusal to let the machine be examined by independent engineers, Ben then made a formal complaint to the Department of Justice (Consumer Affairs Victoria).

The Government agency would not comment on its investigation of Apple. But, as if by magic, eight weeks later Apple asked Ben if it could re-examine the computer at its Sydney headquarters. Following this, the company admitted to Ben that it could not find any trace of liquid residue and that it would honour the warranty after all.

APC asked Apple the following questions: "What did Apple find when it examined Benjamin Thomas' notebook at Apple HQ? What was the cause of the



melting? Is there any safety risk involved with PowerBooks that get so hot that their keyboards melt and fuse to the screen? What will Apple do to ensure that Apple certified technicians at third-party retailers do not make the same mistake in assessing future warranty claims?"

Media spokesman Rob Small asked for extra time to consult with colleagues. The formal response came from Apple a day later: "The matter is closed and Mr Thomas has a new

machine courtesy of Apple." The company ignored APC's questions about product safety and warranty handling.

Ben is relieved to have the refund for the faulty computer, but is ropeable that Apple strung him along for five months before honouring the warranty. He has started a Web site to gather accounts of cases from other PowerBook owners around the world who have had the same thing happen to them (www.overcookedbook.com).

SPARKS FLY WITH TOSHIBA POWER PACK

Dear Watchdog,

Recently, I knocked over my Toshiba A20's power pack from where it was sitting on the table on its narrow side. It fell a few centimetres over onto its flat side. The power supply released sparks and a strong burning smell.

I work in the electronics industry and, given the power pack was out of warranty, I cracked it open to see if there was anything obvious I could repair. The adaptor was well-constructed, but the design was flawed: there was no insulation around a 240-volt inductor (the "lifesaver wrapped up in copper wire" in the "before" photo I've provided). You can see that there is only a 3mm gap between it and the earthed heat sink that cools the power transistors.

The inductor must have moved slightly when the power pack tipped over and made contact with the heat sink. The inductor had a visible burn mark and a hole in the windings where the wire had been vaporised.

Given the obvious fire danger, I figured I would do the right thing and let Toshiba know of the design flaw, and advise them of an easy way to fix it with a dollop of insulating silicon.

I couldn't find an email address on Toshiba Australia's Web site so I called their hotline. When I got through and told them my concern, they said they couldn't help me, saying, "it's not a warranty job" and "we have no records of there ever being a fault with the power supplies."

They made no attempt to get my details and no attempt to get ahold of the power supply for their design team to look at. I wasn't even trying to get the power supply repaired or replaced as a warranty job. I now have serious doubts on the safety of my other Toshiba products if they can't even be bothered to listen to an obviously dangerous occurrence. I always thought this was the stuff product recalls were made of.

**Pete Armstrong
Edinburgh, SA**

Toshiba's Public Relations manager, Kristie O'Dwyer responded, in part: "In Peter's particular case, there was a breakdown in problem management by our staff, in that this issue was not correctly identified and escalated for urgent technical evaluation. We have refreshed all call centre staff on this procedure and will routinely review this in staff meetings to



ensure the correct action continues to be taken in the future.

"Toshiba and our staff regret that Peter's call was not handled effectively and we would like to thank Peter for raising his concern and then escalating this issue to APC. This has given Toshiba the opportunity to correctly address Peter's concerns.

"We have spoken to our colleagues in Tokyo and we will be in contact with Peter directly in order to address the issue with his AC Adaptor," O'Dwyer concluded.

Peter supplied these photos of the original, burned-out power supply, and one with a modified design supplied by Toshiba



which resolved the problem. Toshiba supplied him with a free replacement adaptor by overnight courier following his Watchdog complaint.

DRM for dummies, by dummies

DRM is no longer a way to protect people's copyright works, it's just a way of forcing people to pay more, argues reader *Greg Pavlou*.

DRM proponents need a good kick in the backside. It is no longer just a way to protect IP. When DRM is used to restrict competition and help keep prices high then it should be ruled invalid. It is the only way to keep the media industry relatively honest. Like the Sony PlayStation mod chipping case reported in last month's *APC*: if you use DRM and it has any foreseeable effect other than restricting unauthorised copying, then circumventing it should be legal. DRM and copyright protection has never stopped piracy. So why is it still being used?

The Sony case was not about protection of the software but the hardware. Sell the game console cheap and sting them with the games. That's a marketing issue and you can't cry foul if it doesn't work. It does not deserve the protection of the law. No one owes Microsoft (or anyone else) a living.

Most large media corporations only have themselves to blame for their current predicament. The problem is not piracy, rather content. You can have as many different ways of delivering the

media to the consumer as you like but I'm not paying good money for rubbish. When was the last time you actually watched a movie you wanted to see again? Pay TV is just where old reruns go to die. The slogan in TV seems to be "if someone comes up with a unique new show, clone it until everyone is sick of it".

I don't dispute the rights of copyright holders to a particular work. However, copyright is not meant to protect industries from anything that competes with them. Yet, it seems this is what the patent and copyright holders are trying to achieve. Perhaps the only language they will understand is a penalty of losing individual copyright protection — found guilty of using copyright to price fix or monopolise a market.

It seems the big boys have given up on providing value and instead of enticing us with their wares, we are bullied, blackmailed or otherwise forced to use or upgrade their products.

*Greg Pavlou
Northcote, Vic*

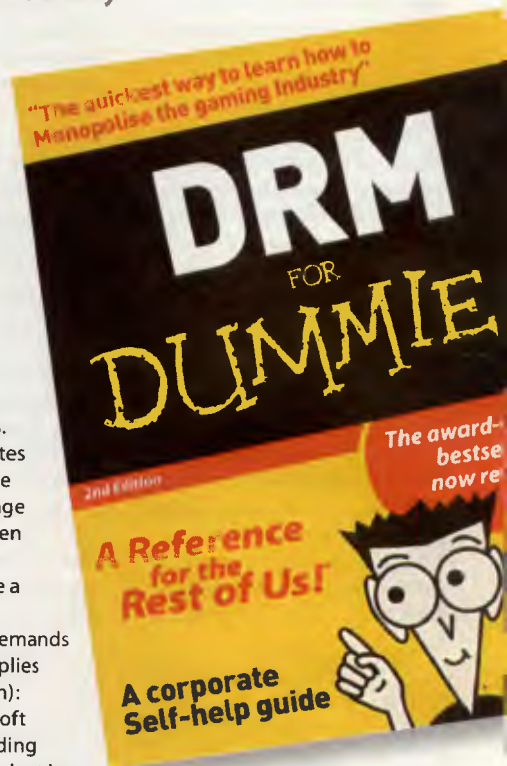
MICROSOFT A THREAT TO ITSELF

I am not an avid fan of Microsoft, but living in the real world, as an IT consultant, I must deal with their products on a daily basis. I admit their Access database product has filled the need of a specific market.

I have used and developed Access databases for many years. I also need to email updates to clients on occasion. The warning message (see page 34) from MS Outlook, when sending an Access file as an attachment, should be a concern for Microsoft.

In a popup box that demands the user's attention, it implies (my cynical interpretation):

"Warning. This Microsoft product that you are sending via another Microsoft product is a potential disaster and may be rejected by yet another Microsoft product. Do you really want to be this silly?"



DRM: Heading away from Management, towards Monopoly.

letter of the month

MORE FRAUD ON EBAY

I read with interest the Watchdog article on eBay fraud and listing of iPods (*APC* November 2005, page 26). The other night, while browsing on eBay, I came across some rather cheap iPods for sale.

After some further investigation, and remembering the information I read in your article, I realised the account selling them was compromised and I really should try and report it.

This sounds a lot easier than it turned out to be!

My first thought was to contact LiveHelp. Unfortunately this is not available after 10pm, so I logged

on to eBay USA to see if I could tell someone there.

After punching several combinations of "help needed", I finally managed to get the LiveHelp option and got ahold of someone who told me I needed to send an email to the fraud team and they would respond in 24-48 hours. My argument that these were one-day listings fell on deaf ears. I sent an email to the fraud team as requested.

The next morning, with three hours to go on the listing and no response from the fraud team, I decided to try LiveHelp in Australia, who did remove the listings.

It seems amazing that I had to go to so much trouble to report this and to save eBay money! The customer service attitude at eBay is blasé to the point of non-existence. I pursued this matter as I believe in protecting the online community of eBay sellers that I belong to. It's just a shame that I seem to hold this more important than eBay themselves.

Also, I should note that no-one from eBay at any point has had the common courtesy to thank me for my time and for bringing this to their attention.

*Jay Couch
Pakenham, Vic*

Jay's efforts to do "community policing" on eBay are admirable, even if it was difficult to get eBay to do anything about his report. For his effort, he snags this month's Letter of the Month prize, a Logitech MX3000 wireless keyboard and laser mouse set, valued at \$179.95.



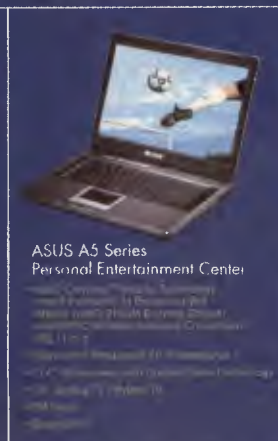
ASUS recommends Windows® XP Professional



Be there, wherever you are



ASUS W1, W2, A5 and A7 Notebook Series Offer Wireless Digital TV Broadcast



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INTENDED MARKET Everyone PROS Bright, sharp display; fast response; huge! CONS Minimal OSD controls; did we mention it's huge? VERDICT 4/5

When we reviewed Dell's 24in wide-screen 2405FPW monitor (APC November 2005, page 51), we were absolutely blown away by its quality and value. So, when we got wind that there was going to be an updated 30in model, we jumped on the phone to get one in.

Half the office crammed into the Labs when it arrived. Once out of the box and perched menacingly on the desk, the room was quiet apart from the muttered variations of "phwoar".

Getting it up and running was a bit of a task in itself, as you'll want some serious graphics to power this beast. It's not unreasonable, given the target audience, but you'll need a 7800GTX card with a dual-link interface port to push the native resolution, and a suitable cable too — your run-of-the-mill DVI cable won't cut it. While such a cable isn't bundled with the monitor, chances are you received one with your top-of-the-line graphics card, so there should be no major dramas there.

Once connected, our biggest challenge was finding something worthy of displaying on such a scale. The obvious choice was World of Warcraft — it features native high-res wide-screen support. You really haven't lived until you've seen your favourite game running in a native resolution of 2,560 x 1,600. WoW looks great even at 1,024 x 768 — nearly doubling that resolution was nothing short of gorgeous. We fired up Half-Life 2 and the new Lost Coast HDR (High Dynamic Range) demo, and spent fifteen minutes rolling our tongues back into our mouths and marvelling at the sharpness.

The new 30in panel has had its specs dropped slightly on paper, reducing the contrast ratio (by 300) to 700:1 — and the brightness dropping 100nits to 400cd/m². Despite these changes, we had to turn down the brightness slightly so we didn't get a suntan. Obviously for a panel of this size (and to get it to

this price point), concessions have been made. Luckily for everyone concerned, the performance is just as good as its little brother, the 2405FPW.

Dell has kept the multifunction memory card reader and four USB ports as standard, but the updated model scraps the AV inputs, Picture in Picture, Picture by Picture and horizontal-to-vertical pivot support we loved about the 2405FPW. The bezel is much thinner and less cluttered, featuring just + and - adjustment buttons for brightness. Perhaps Dell took our OSD gripes to heart and wanted to shut us up once and for all, but in all honesty we'd rather have clumsy manual controls than none at all.

There's no more VGA support, but the DVI does support an integrated HDCP decoder chip (giving you protected content decoder support in Windows Vista).

On the plus side, the panel's pixel response has been taken down a further 2ms (from 16ms) to 14ms. Given that this is nowhere near as drastic as the leap from 20ms to 16ms, or 16ms to 8ms, there's no noticeable difference here for playability or desktop usage. That said, the panel is just as good as the earlier model for fast action like first person shooters and DVDs. The only major concern we had was the sheer size of it. If you're thinking about buying one of these bad boys, make sure you can give yourself enough

space to sit away from it (rather than having to shift your eyes or flick your head to view the entire screen).

This monitor would make a fantastic combo multimedia display for serious gamers and home entertainment enthusiasts. If you're looking to chuck this in your lounge room and drive it with a Radeon 9250 or GeForce 4 Ti4200 in your silent media PC — you're out of luck.

In the end though, we had to sit back and ask ourselves if bigger really is better. While we were all amazed with the size and performance, chances are, unless you have the space to distance yourself from it, this won't replace your existing desktop monitor.

Dan Chiappini



With amazing display quality, we still have to ask, is bigger really better?

Zenonic Z500 HD Network DVD player

Home entertainment nirvana? Here we come.



● **CONTACT** Zenonic ● **PHONE** 1300 762 192 ● **ONLINE** www.z500series.com ● **PRICE** \$569

● **INTENDED MARKET** Everyone ● **PROS** Wired and wireless networking; plays lots of formats. ● **CONS** No Blu-ray or HD-DVD playback. ● **VERDICT** 4.5/5

MTV's "Pimp My Ride" features a team of rev-heads converting viewers' stock-standard cars into customised beasts on wheels. If you gave them a boring old DVD player, you'd get back something like Zenonic's Z500 High Definition Network DVD player.

The Z500 lets you enjoy your digital video and music library from the couch, through your home entertainment system, rather than on the computer in your study.

The Z500 can handle pretty much any format you throw at it.

A progressive-scan DVD player, it converts NTSC DVDs to PAL and vice versa — letting you watch Region One NTSC DVDs from the US on any television. It also handles VCD, SVCD, Windows Media Video 9, Nero Digital, MPEG-1/2/4 (including DivX and Xvid) and QuickTime with MPEG4 encoding — burned to CD or DVD, or from a USB device. It can play HD video files up to 1080i, but won't play Blu-ray or HD-DVD discs.

As for music, the Z500 handles audio CDs as well as MP3, WMA,

WMA-protected, WAV, AAC, OGG Vorbis and FLAC audio files, plus playlists. It also displays JPG/JPEG2000, BMP, GIF and PNG images, with TIFF expected in a firmware upgrade.

Thanks to onboard Ethernet and 802.11g wireless you can play files stored on any computer or network storage device around the house. Most file formats don't require you to install the provided streaming software — simply enable file sharing on your computer and you're away.

The Z500 is also Internet-enabled for playing streaming audio and video as well as downloading information such as CD track details and even four-day weather forecasts.

Video outputs include

composite, component and S-Video along with SCART and the new High Definition Multimedia Interface (HDMI). Audio outputs include analogue stereo and 5.1 outputs, along with coaxial and optical digital.

Despite its array of features the Z500 is simple to operate, using a clean interface that is easily read from the couch. The unit looks at home with your other AV devices, sporting a large LCD which provides track information etc.

The lack of Blu-ray or HD-DVD playback is all that prevents the Z500 from being the ultimate souped-up DVD player. Throw in two TV tuners, a DVD recorder and a hard drive-based PVR and you'll be in home entertainment nirvana.

Adam Turner



NVIDIA GeForce 6800 GS

The graphics card success story of 2004, repackaged for 2006.

● **CONTACT** NVIDIA ● **PHONE** N/A ● **ONLINE** www.nvidia.com ● **PRICE** \$400

● **INTENDED MARKET** Everyone ● **PROS** High performance gaming at a mid-level price. ● **CONS** Available in PCI-Express only. ● **VERDICT** 3.5/5

NVIDIA's GeForce 6 series was the success story of 2004. After an extended floundering in the realms of mediocrity, the GeForce 6800 snatched back the performance crown from ATI while simultaneously leapfrogging them in terms of technology. This was consolidated upon with the launch of the GeForce 7800, and it wasn't until late in 2005 that ATI struck back with the long delayed appearance of its X1800, X1600 and X1300 cards.

To combat the arrival of the X1600, NVIDIA has launched the GeForce 6800 GS. Designed to sit at the upper end of its mainstream product line, this card is similar in specs to the GeForce 6800 (but uses a revamped chip design to allow NVIDIA to produce them at

lower costs and higher volumes than before).

Featuring 12 pixel pipelines and 5 vertex pipelines, the 6800 GS GPU runs at 425MHz (faster than the original GeForce 6800). This is paired with 256MB of GDDR3 memory running at 500MHz to create a fully featured PCI-Express mainstream graphics card that delivers surprising performance for the price. Like all new NVIDIA cards, it also supports SLI so you can add a second card to significantly up your performance. But, the other card needs to be a GeForce 6800 GS — it won't work with previous GeForce 6800 family members.

Our testing at 1,280 x 1,024 shows these specs translating to performance on par with the GeForce 6800 GT, as the higher

clock speed of the 6800 GS seems to make up for it having less pixel pipelines. This is in itself a mean feat, as the GeForce 6800 GT is still a highly competent offering. More than that, it translates to near identical performance to ATI's X1600 card. When the resolution increases, the 6800 GS pulls ahead of the X1600 thanks to increased memory bandwidth.

With the 6800 GS, NVIDIA has again produced a compelling offering at a mainstream price point. At around \$400, it's still at the upper end of the market, but it delivers performance comparable to products that cost twice that only a year ago.

John Gillooly





GIGABYTE i-DNA

GEFORCE™ 6150/6100 Series Motherboard
Optimized for AMD Athlon™ 64 Processor Family



Performance DNA

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- NVIDIA™ PureVideo™ Technology
- Microsoft® DirectX® 9.0 Shader Model 3.0 Support
- PCI Express/Serial ATA 3.0 Gb/s



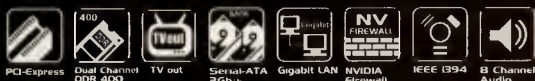
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i-DNA series

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- Supports NVIDIA SATA 3Gb/s and RAID 0, 1, 0+1, 5 function
- Provides world-class HDTV-out functionality
- Integrated Gigabit Ethernet solution with NV Firewall support
- Integrated IEEE1394 FireWire interface



i-DNA series

GA-K8N51GMF-9 NVIDIA Geforce 6100 Chipset

- AMD Athlon™ 64 X2/ Athlon™ 64 socket 939 platform
- Integrated NVIDIA CineFX 3.0 Graphics Engine
- Microsoft™ DirectX™ 9.0 Shader Model 3.0 support
- Supports Dual Channel DDR400 memory architecture
- Supports NVIDIA SATA 3Gb/s and RAID 0, 1, 0+1, 5 function
- Integrated Gigabit Ethernet solution with NV Firewall support
- Integrated IEEE1394 FireWire interface



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GIGABYTE
TECHNOLOGY

Hit the shops

Update yourself with the top range of products in this month's best buys.

Each month the APC Labs team buries itself in a mound of product to find the best of the best for your purchasing reference. Identified for you according to our bench testing, these are the current top products available.

Each state or territory has its own fair trading legislation which is designed to prevent consumers being mistreated by vendors or retailers, but the national Trade Practices Act 1974 provides protection across a range of

areas. It provides guidelines for warranties and sets the standard for "merchantable" quality goods. It also offers protection against misleading conduct on the part of retailers. The Federal Government's online consumer

portal can be found at **www.consumersonline.gov.au**.

The Australian Competition and Consumer Commission (ACCC) also offers protection in a range of areas. It can be reached at **www.accc.gov.au**.

Best Value

DESKTOP SYSTEMS

PC Quest The Signature

PC Quest's The Signature has a strong focus on gaming, combining this with a dual-core CPU to make it a good all-round PC. It has two GeForce 6800 GT cards running in SLI configuration, and its Athlon 64 X2 4200+ CPU performed well under productivity and multimedia benchmarks.

- **CONTACT** PC Quest
- **PHONE** 1300 550 118
- **ONLINE** www.pcquest.com.au
- **PRICE** \$4,000

Dell Dimension 9100

In terms of robust all-round computing, Dell's Dimension 9100 is a great option. Built around a 3GHz dual-core Intel Pentium D 830 CPU, 512MB of DDR2 RAM, ATI RADEON X600 graphics and a 250GB hard disk, it delivers across the board.

If you do a lot of system-intensive tasks, like video editing or gaming, there are aspects of the

machine you'd have to customise. However, if your computing needs are general desktop work, Web surfing, email and occasional gaming and media creation it has the grunt to get the job done.

- **CONTACT** Dell
- **PHONE** 1800 812 393
- **ONLINE** www.dell.com.au
- **PRICE** \$2,399



Best Value

MOTHERBOARDS

ASUS A7NX-E/AMD Sempron 2600+

AMD's entry-level Sempron processors offer a 333MHz FSB and 256KB of level 2 cache. Virus protection is enabled by Windows XP. Combined with an ASUS A7NX-E Deluxe motherboard, it's a powerful yet low-cost base platform.

- **CONTACT** Achieva
- **PHONE** (02) 9742 3288
- **ONLINE** www.achieva.com.au
- **PRICE** Board, \$200; CPU, \$130

ASUS A8N-SLI Deluxe/AMD Athlon FX-57

ASUS' A8N-SLI Deluxe offers great performance, SLI capabilities, three PCI slots and support for eight SATA II drives using onboard NVRAID.

Audio includes onboard digital and optical S/PDIF outputs. The two Gigabit Ethernet ports have ASUS' AI NET 2 cable fault technology enabled. The software package includes NVIDIA nTune

and Firewall, ASUS PC-Probe, AI Booster, Norton Internet Security 2005, Winbond Voice Editor and InterVideo WinDVD. Add AMD's Athlon FX-57 processor, and you've got a super-fast solution.

- **CONTACT** Achieva
- **PHONE** (02) 9742 3288
- **ONLINE** www.achieva.com.au
- **PRICE** Board, \$299; CPU, \$1,400



Best Value

NOTEBOOKS

Pioneer Dreambook 805

Two thousand dollars buys a lot of notebook these days. If it's pure grunt you're after, the Pioneer Dreambook 805 has it in spades with a 1.8GHz Pentium M, 512MB of RAM and a 60GB hard drive. A GeForce Go 6200 means the occasional game won't be out of the question either.

- **CONTACT** Pioneer Computers
- **PHONE** 1300 550 118
- **ONLINE** www.pioneercomputers.com.au
- **PRICE** \$1,999

Samsung X20

Samsung's svelte new Centrino notebook is dazzling. Sporting a 1.73GHz Pentium M, 512MB of RAM and a 40GB hard disk, it's no slouch. But where it really shines is in staying power. Running for over four hours and 15 minutes without a power cable in sight, the X20 will keep you working, or the kids quiet, for as long as it takes.

- **CONTACT** Samsung
- **PHONE** 1300 369 600
- **ONLINE** www.samsung.com.au
- **PRICE** \$1,799



MONITORS MONITORS MONITORS

Dell 2405FPW

Dell's 16ms, 24in widescreen LCD monitor is hot. Its 1,920 x 1,200 resolution panel dominates your view, while its plethora of inputs, from DVI to component video, make it ready to cope with most image output devices. There's even a card reader and four-port USB hub. Image quality is superb, with no evidence of ghosting in games or videos.

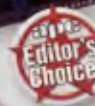
Support for HD video resolutions means this screen will get more useful as HD-capable set-top boxes, game consoles and TV tuners hit the market.

● **CONTACT** Dell

● **PHONE** 1800 812 393

● **ONLINE** www.dell.com.au

● **PRICE** \$1,789



Best Value

CMV CT-720D

The CT-720D from CMV is a stylish LCD monitor with above-average image quality and a very bright screen, suitable for environments with lots of ambient light. Add the 8ms refresh rate and supplied 2.5W speakers, and you have an excellent value package.

● **CONTACT** Impact Systems

● **PHONE** (02) 9621 2999

● **ONLINE** www.impactsystems.com.au

● **PRICE** \$425

Best Value

MULTIFUNCTION PRINTERS

Canon PIXMA MP780

Canon is no stranger to the printer market, having served up quality standalone photo printers and scanners for yonks. Interested in seeing if their MFPs (multifunction printers) followed suit, we got one in as part of our Labs challenge (page 50). We were blown away by its speed and quality when we put it through its paces.

In our blind quality test, the PIXMA MP780 was rated best overall for its scan, test print quality and colour copy results. If you have a small or home office, this unit truly can do it all. Replace four or five devices with just one compact MFP — without compromising on quality.



NEW ENTRY



● **CONTACT** Canon

● **PHONE** 1800 01 167

● **ONLINE** www.canon.com.au

● **PRICE** \$549

Brother MFC-5840CN

Brother's MFC-5840CN produced great print results in both colour and black and white. It's not the fastest, but quality is worth waiting for. At just \$429, it has everything you could possibly want at a price that won't break the bank. Perfect for a startup company (or kids' school projects).

● **CONTACT** Brother

● **PHONE** (02) 9887 4344

● **ONLINE** www.brother.com.au

● **PRICE** \$429

Best Value

HANDHELD HANDHELD

Palm T/X

Designed as a corporate workhorse, Palm's T/X PDA combines a rich feature set with great connectivity options. It sports a 300MHz CPU, 128MB of non-volatile memory, 320 x 480 resolution colour screen, dual-mode Wi-Fi and Bluetooth. Storage is expandable via an SD card slot, and Palm's Multi-Connector handles PC

connectivity, which caters for USB cables and cradles.

The T/X fixes some of the niggles in its predecessor, and all-round performance makes it stand out in the crowd.

● **CONTACT** Palm

● **PHONE** (02) 9844 5420

● **ONLINE** www.palm.com.au

● **PRICE** \$499



Best Value

Palm LifeDrive

Palm's "Mobile Manager" product takes the tried-and-true PDA design and marries it to a 4GB hard drive. With a 320 x 480-pixel display, Wi-Fi, Bluetooth and 64MB of RAM, the LifeDrive provides storage capacity galore, plenty of features and Palm power in one small package.

● **CONTACT** Palm

● **PHONE** (02) 9844 5420

● **ONLINE** www.palm.com.au

● **PRICE** \$899

Best Value

ADSL MODEMS ADSL MODEMS ADSL MODEMS

Billion BIPAC 7402

One of the new breed of super-fast ADSL2+/2+ modems, the Billion packs the right combination of features with quick download speeds. You get a four-port switch, Wi-Fi (802.11b), firewall and VPN support.

Importantly, there are enough customisation options to handle multiple PCs, software

types and games. Home business users will appreciate the built-in encryption engine.

The BIPAC 7402 averaged an awesome 2,020KB/s in short-range testing (1km), downloading a 635MB file in five minutes.



● **CONTACT** PC Range

● **PHONE** (08) 8322 9544

● **ONLINE** www.pcrange.com.au

● **PRICE** \$239

Belkin F5D7630au4A

The F5D7630au4A is one of the best-value all-in-one routers available today. Superb out-of-the-box functionality, SSID hiding, WPA-PSK and 128-bit WEP wireless security features are all offered. However, there's no print server capability or line filter in the retail box.

● **CONTACT** Belkin

● **PHONE** (02) 4372 8600

● **ONLINE** www.belkin.com.au

● **PRICE** \$300

Best Value



Best Value

WIRELESS ROUTERS WIRELESS ROUTERS WIRELESS

D-Link DI-624S

D-Link's DI-624S provided a long range throughput of up to 15.1Mbit/s at 15m under benchmarking, with a signal strong enough to share files and an Internet connection. Two USB ports and other options makes this a great router/wireless access point at a bargain basement price.

- **CONTACT** D-Link
- **PHONE** 1300 700 100
- **ONLINE** www.dlink.com.au
- **PRICE** \$229.95

Netcomm NB620W

NetComm's NB620W offers fast data throughputs and an incredible range of features, such as URL, keyword and file blocking. Users can allow or block potentially dangerous

- **CONTACT** NetComm
- **PHONE** (02) 9424 2070
- **ONLINE** www.netcomm.com.au
- **PRICE** \$298

formats such as BAT and EXE, as well as media extensions like MP3 and ASF to keep your home or business network safe. Grab one of these nifty little numbers and take your networking to the air.



Best Value

OPTICAL DRIVES OPTICAL DRIVES OPTICAL DRIVES

Gigabyte GO-W1616A

The GO-W1616A drive from Gigabyte is capable of both 16x DVD±R and 4x Double Layer DVD+R burning at a price that makes DVD burning a reality for the masses. It doesn't skimp on the bundle either — Nero 6 OEM Suite 3 and a black face-plate are excellent value extras.

- **CONTACT** Rectron
- **PHONE** (03) 9561 6166
- **ONLINE** www.rectron.com.au
- **PRICE** \$93.95

ASUS DRW-1608P

Fast and feature-packed is the best description for ASUS' DRW-1608P drive. Capable of burning Double Layer discs at 6x, this drive wrote 8.5GB of data to a single-layer disc in a shade under 19 minutes, at an average speed of 5.84x. It can also burn DVD±R discs at 16x, and this speed was achieved with the standard 2.4x Double Layer media, rather than any specialised 6x

discs.

The drive ships with Nero 6 OEM Suite 3 and Ulead DVD MovieFactory 3 SE for basic DVD-Video authoring. A well-rounded offering and the fastest option for those focusing on Double Layer burning.



- **CONTACT** ASUS
- **PHONE** 1300 278 788
- **ONLINE** www.asus.com.au
- **PRICE** \$129

Best Value

PRINTERS PRINTERS PRINTERS PRINTERS PRINTERS

Canon LASER SHOT LBP-2410

A desktop colour laser at a price unheard of just two years ago. Rated at 16ppm mono and 4ppm colour, it's perfect for the home or small office. Hi-Smart Compression Architecture means it only needs 8MB of memory to store pages.

- **CONTACT** Canon
- **PHONE** 1800 021 167
- **ONLINE** www.canon.com.au
- **PRICE** \$699

Fuji Xerox DocuPrint C525A

Super-fast mono printing and brilliant colour make the C525A hard to beat as a replacement for an old mono unit.

You get 64MB of memory and a 9,600 x 600 interpolated print resolution — some competitors can only claim 2,400 x 600.

The standard tray can handle 200 sheets, and 250-

or 500-sheet trays are available.

Settings can be adjusted directly at the printer. It's a little noisy, but the levels are acceptable for most environments.

- **CONTACT** Fuji Xerox
- **PHONE** 13 14 12
- **ONLINE** www.fujixerox.com.au
- **PRICE** \$799



Best Value

BUSINESS SERVERS BUSINESS SERVERS BUSINESS SERVERS

Maxtron CSPC-823SATA

This dual Xeon 2.8GHz server comes in a 2U rack-mount enclosure. It features 1GB of RAM and 198GB of disk space in a RAID 5 array. It even includes dual hot-swappable 600W PSUs. It's highly flexible and a great all-round performer for small businesses with an eye on the future.

- **CONTACT** Digicor
- **PHONE** (03) 9560 7222
- **ONLINE** www.digicor.com.au
- **PRICE** \$4,999.50 (without OS)

Plus Titan OP250

The Plus Titan OP250 is built around dual Opteron 250 CPUs and AMD's 8311/8111 server chipset. It has a generous 2GB of RAM and 223GB of storage thanks to a RAID 0+1 array. All this is packed into a mini-tower case. It delivered some truly outstanding performance in APC Labs' server benchmarks, and has a well-rounded hardware

specification. The three-year onsite warranty should give peace of mind to companies lacking a full-time technician to maintain the server.

- **CONTACT** Plus Corp
- **PHONE** 1800 007 587
- **ONLINE** www.pluscorp.biz
- **PRICE** \$4,695 (without OS)



VIDEOCARDSVIDEOCARDSVIDE

VIDEOCARDS

NVIDIA GeForce 7800 GTX

The GeForce 7800 GTX is capable of making even the most system-intensive game run smoothly at high resolutions, thanks to 24 highly tweaked pixel-shading pipelines.

This PCI Express-only card supports hardware decoding of WMV9 high-definition video, and H.264

decoding is literally just around the corner. Available from a number of manufacturers, the 7800 GTX features 256MB of GDDR3 memory, dual DVI outputs and TV-out. For a truly decadent gaming experience, you can run two cards in SLI mode.



CONTACT NVIDIA

PHONE N/A

ONLINE www.nvidia.com

PRICE \$599

Leadtek WinFest PX6600 GT THD 128MB

Offering good gaming performance and value, Leadtek's new WinFast card is quiet and has a solid software package. The PX6600 GT includes 128MB of GDDR3 RAM, a 128-bit memory bus, eight pixel pipelines and DirectX 9's Shader Model 3 support.

CONTACT Reckton

PHONE (03) 9561 6166

ONLINE www.reckton.com.au

PRICE \$299

VOICECOMMUNICATIONSVoice Communications

Trillian

Keeping track of friends or workmates on different instant messenger services is a pain. Trillian is the undoubted leader of the All-in-One IM clients, supporting Yahoo!, AIM, MSN, ICQ and IRC. If that wasn't enough acronyms, Trillian's got a skinnable XML interface too, (so with a little work, you can rearrange the front end as well).



CONTACT Cerulean Studios

ONLINE www.ceruleanstudios.com

PRICE US\$25

Miranda IM

Miranda's the GPL darling of the IM world. It's very flexible, developed around resource efficiency and to be easy to use. With no setup to worry about, and basic support out of the box, plug-ins need to be downloaded to support a range of different IM services — but what a range (350 at last count, so get downloading).

CONTACT Miranda IM

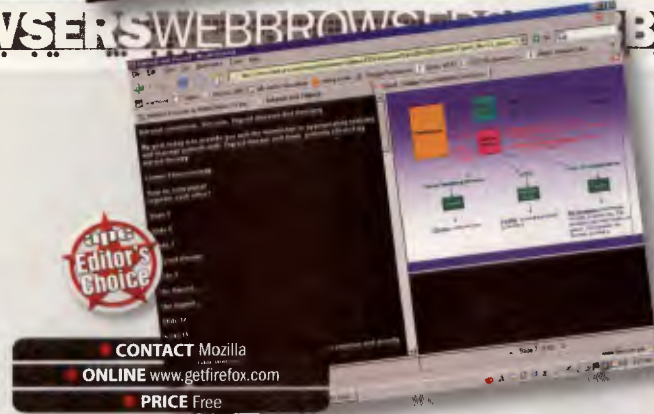
ONLINE www.miranda-im.org

PRICE Free

WEBBROWERSWEBBROWERS

Mozilla Firefox 1.5

Since version 1.0 of Firefox, there's been some great improvements to the usability and stability of this up-and-coming browser. The latest version includes better responsiveness, drag and drop tabs and automatic updating. If you're still using Internet Explorer, then maybe it's time to make the jump: Firefox has yet to disappoint in the APC offices.



CONTACT Mozilla

ONLINE www.getfirefox.com

PRICE Free

Opera Web Browser

Opera was the alternative browser to Internet Explorer and Netscape way back in the day, and it's still going strong. With the most bells and whistles in the browser scene by far (such as gesture-based browsing, voice recognition and a note taking system), Opera's closer to a tool than a dumb window onto the Web.

CONTACT Opera

ONLINE www.opera.com

PRICE Free

HARDDISKVISUALISERSHARDDISKVISUALISERS

TreeSize

Checking just which directories and files are eating up that precious disk space is difficult (when peering at Windows' file size indicators). This program from JAM Software installs, scans, then breaks down subdirectories, giving the total amount of disk space consumed — along with colour-coded tags for a quick glance. Size

information is stored, and can be graphed and exported for closer evaluation.



CONTACT JAM Software

ONLINE www.jam-software.com

PRICE \$37.95

SequoiaView

A file and directory size visualiser, SequoiaView is perfect for those who've acquired large numbers of big files (such as a movie or MP3 collection). It lets you identify the directories and files hogging all your disk space, so they can then be dealt with (or spared) accordingly.

CONTACT Technische Universiteit

ONLINE www.win.tue.nl/sequoiaview

PRICE Free



six

MFPs TESTED

RATED CRITERIA:

Print speed and quality

Scan speed and quality

Copy speed and quality



THE
players

Viva la RESOLUTION

Dan Chiappini and Nick Race check out the latest in multifunction printers for the home and small office. They're replacements for printers, scanners, fax machines and more.



Despite the amount of rhetoric over the years, the general consensus is that the notion of the paperless office is a bit of a dud. In fact, many of the printer, copier and fax manufacturers are now talking about the "less paper" office. That said, while many larger organisations have reduced their print outputs through electronic invoices and documents, smaller businesses and homes still rely on multiple devices to get the job

done. For a long time, good quality printing needed a standalone photo printer, while faxing and basic copy functionality could be had on a thermal or plain paper fax. Infrequent scanners (such as those needing to import images for kids' projects and the like) needed a separate scanner, meaning more cost and more desktop space sacrificed to peripherals.

The first wave of all-in-one type devices was a mixed blessing,

taking the functionality of each of the most required products and merging them together into one chassis (and using one type of ink). While this evolution was a huge breakthrough, it wasn't uncommon to find one piece of equipment top notch and the others feeling more like tacked-on extras with results barely comparable to their standalone brethren.

As with any technology though, the kinks have been ironed out and



THE
players

VENDOR	MODEL	PRICE	ONLINE	PHONE
1. Canon	PIXMA MP780	\$599	www.canon.com.au	1800 021 167
2. Dell	Photo AIO Printer 964	\$409	www.dell.com.au	1300 303 107
3. HP	Photosmart 3310	\$449	www.hp.com.au	13 23 47
4. Lexmark	X7170	\$299	www.lexmark.com.au	1300 362 192
5. Epson	Stylus Photo RX630	\$399	www.epson.com.au	1300 361 054
6. Brother	MFC-5840CN	\$379	www.brother.com.au	(02) 9887 4344



“THE MP780 SPORTS PRINT, COPY, FAX, SCAN, A 35-PAGE ADF AND BUILT-IN DUPLEXING

the bugs fixed. We're now at the point where, for a couple of hundred dollars more than a standalone, multifunction products are not only holding their ground, but slowly eating at the market share of single-function devices.

We sent out the call to manufacturers to supply us with multifunction printers (MFPs) capable of printing, faxing, scanning and copying — units designed for small or home office use. We opted for a sub-\$600 price tag as it's just high enough to keep out the el cheapo riff-raff, but expensive enough that you're not going to skimp on features you actually need.

The functionality of the units across our selection was quite similar, although the prices varied greatly. The HP Photosmart 3310 includes a colour fax, copying functionality, 2.5in LCD screen for menu selection and image manipulation, and printing (of course), but did not include an automatic document feeder (ADF)

for scanning and faxing — though some other models did.

The Lexmark X7170 has graced the hallowed benches of the APC Labs before. Its colour printing and high-speed faxing, scanning and copying results were extremely similar to our last test of this low cost, high-performance unit. The X7170's ADF is also a useful inclusion. The Canon PIXMA MP780 was the next to arrive, and its sleek lines and impressive functionality (on paper) were soon put to the test. The MP780 supports the usual printing, copying, faxing and scanning, but also includes a 35-page ADF and built-in duplexing — perfect for a small business.

The new Dell Photo All-In-One 964 was a surprise — looking more like a mutated iPod than a printer, its piano-white and silver finish looks quite modern compared to the greys and blacks of the other units. Its functionality was identical to the Lexmark X7170, with the same print/fax/copy/scan and ADF abilities as the other units on test.

For the first time, a Dell printer includes a small colour LCD screen for menus and previews, joining the ranks of Epson and HP.

The Epson Stylus Photo RX630 was another nice little unit, but, like the HP, lacks a document feeder. The Epson's colour LCD was a nice touch and provided previews of scanned documents for alignment checking. Last, but certainly not least, is the Brother MFC-5840CN, Brother's top-of-the-line colour-ink-based MFP, with all the bells and whistles. The usual scan, fax, print and copy functionality is there, as is an ADF.

We evaluated each unit based on the following criteria: print speed and quality; scan speed and quality; and, copy speed and quality.

We pit the MFPs print-head to print-head with our standardised testing procedure to establish which provided the best quality and functionality for the small or home office user. Our testing procedure consisted of a 20-page document (containing text, images

and graphs), a colour print of a photo test target (to evaluate colour consistency, fine detail and skin tones), plus colour copies of a photo magazine cover to judge accuracy of scanning and copying. All of the tests were timed and results are shown in the feature table (page 56).

HERE COMES SPEED PRINTER

We used a carefully selected, staple word document for our printer testing, one which we believe best represents typical home and office usage models: it's a copy of Microsoft Windows 2000 Remote Operating System Installation white paper. We used it because it simulates multiple text fonts, sizes and styles, as well as images and graphs. Using this document gives us an accurate look at real-world performance from each printer. We fired up the test and printed the first 20 pages in the normal quality mode. While many of the printer manufacturers quote page-per-



minute results in draft or fast modes, the quality is really only suitable for in-house documents, not clients. We printed the same document in colour and mono modes and compared results.

Lexmark came in fastest, printing the document in four minutes and 31 seconds — 13 seconds ahead of Canon with a time of 4:44. HP nipped closely at Canon's heels — a further 10 seconds behind at 4:54.

At above five minutes, the pack spread out considerably: Dell just shy of six minutes at 5:50, Brother at 7:53 and Epson bringing up the rear with 9:31.

In the grander scheme of things, speed is certainly down the list when it comes to weighing up whether or not you should buy one model over another, but at more than double the time taken between first and last place, both will afford you a coffee break while you print that report, but one will let you get back to work much quicker.

Interestingly enough, when it came to the correlation between print speed and quality, the tables turned slightly. Despite coming second for speed, Canon blitzed the field for text and image quality, producing the most accurate colours and sharpest lines and detail. Brother, who dawdled behind the pack at second last for speed, turned around and produced the second best image on show. HP maintained third position for both quality and speed, placing it smack bang in the middle of the pack. Epson and Dell, both taking over five minutes to print, held their bottom-rung positions, while the real shock, Lexmark and its four and a half minute 20 page print speed, was ranked poorest by our expert panel when it came to image and text quality.

COMMENCING SCAN

Scan testing was performed using the cover of a sister publication. The MFPs were set to scan at 300dpi, maximum bit depth, and to export

to a bitmapped format (either BMP or TIFF where the software allowed, avoiding image quality loss due to compression). All the units included software that permitted scanning directly to file on the test PC. The scanned images were evaluated by Chris Zammit, APC's Art Director; one of the keenest eyes in the industry when it comes to image quality and colour accuracy.

The Epson RX630 was first in the hot seat and impressively scanned the test image in 18.25 seconds, the best time of the bunch. After a few more scans by other printers that took significantly longer, we went back and checked the settings, making sure the Epson wasn't scanning in a fast or draft mode. Such was not the case. The Epson's output was ranked fourth of the six devices, being of average quality with some slight graininess to the image, while the colour output was considerably darker than the original.

Next on the bench was the Brother, which took the longest to

scan of all our tested MFPs, with a time of 47.10 seconds. The Brother's output was reasonable, rated as average quality (though with visible line artifacts but good colour reproduction). Even for semi-professional scanning use, some filters in Photoshop would clean the image to a very high quality.

Third we tested the Canon, which scanned the test image in 38.77 seconds. Rated number one by our professional eye, the Canon's scan output was extremely good and was noted for having excellent skin tone reproduction (great for photos with the colours coming out just a little duller than the original image). No major artifacts were apparent and lines were crisp and clear. An excellent result.

HP's 3310 was fired up, with a scan time of 43.62 seconds. The quality of the HP's scanned output was judged second best. The colour reproduction of the scanned image was fantastic, although some granularity was noted in plain



SCANNING IMOGEN

- 1 Brother:** good colour reproduction but visible scan lines mar the image.
- 2 Canon:** great colour reproduction, no visible artifacts and clear, crisp lines.
- 3 Dell:** a yellow tinge and blocky artifacts disappoint.
- 4 Epson:** slightly grainy and murky colour reproduction.
- 5 HP:** excellent colour reproduction but a tad grainy in solid colours.
- 6 Lexmark:** blocky as Lego and with colours muted and dark.

colour blocks. Still, a great overall result was apparent.

Dell and Lexmark were tested together, as befitting their previous extremely close results. The Dell, a new model, has obviously had a recent overhaul, as the scan time was much quicker at 32.53 seconds (the Lexmark model finished in at 43.38). These results earned a fifth place for the Dell and a sixth for the Lexmark (a little disappointing). The two printers showed similar problems with their scanned images, both being noted as being quite blocky, with the Lexmark considerably more so. The Dell's colour output was quite yellowed, being much "warmer" than the original, while the Lexmark's was in the opposite direction — the colours muted and murky.

ATTACK OF THE CLONES

We used the same copy of *Ralph* from the scan tests to evaluate each MFP's copy speed and quality. There was some interesting colour mismatching when comparing

copy prints and onscreen scan images. While users are most likely to do colour copying, we opted to test both mono and colour prints (and compare the speeds of both).

Canon again impressed us by completing its mono copy in just 24 seconds; Lexmark right behind at 26 seconds. However, Canon was six seconds clear of Brother at 30 seconds and nearly 10 seconds ahead of HP with its time of 33 seconds. Dell turned in a slower 40 seconds, while Epson brought up the rear with 47 seconds per page.

In the colour copy stakes, we again saw some place shifting — Canon taking out first place with 34 seconds, while HP moved to second place at 39 seconds, almost 10 seconds clear of Brother at 49 and Epson moving up two places to 51 seconds. Dell and Lexmark again looked like they'd been copying each other, clocking in identically at one minute per colour copy page.

The real surprise this time around was Canon blitzing the rest of the field — not only for speed,

but quality as well. We also have to salute HP's ingenuity here; the 2.5in LCD gives you a clear pre-scan view of your image and allows you to easily crop or resize without first needing to print a copy to check it — a real time and paper saver.

AND THE WINNER IS...

It's quite amazing to realise the range of functionality that can be enjoyed for relatively little cost with these products. Not only are the six MFPs featured in this Labs Challenge all respectable printers, but they're also able to replace much more expensive equipment — such as fax machines and copiers — with relatively good results. Of course, if you're going to be copying loads of documents, then a toner-based copier will be much quicker and cheaper to run, but for a small office where only the occasional document or page needs to go through, then paying for the upkeep of a traditional copier is a money sink that could be done without. Plain paper fax

machines aren't cheap either — especially the higher-speed colour variety that are becoming increasingly popular — so gaining all this functionality in a single unit is extremely good value. The last time APC ran an MFP Labs Challenge, we commented that these printers were like Swiss Army pocket knives — very useful for the range of things you can do with it, but when it comes to the crunch, still inferior to a "proper" knife, screwdriver or whatever that device is for getting stones out of a horse's hoof. Back then, the purchaser needed to realise that with more functions, the less well each particular function tended to work. This time, there was a pleasant surprise. The units here are just as good as standalone products, at least in quality if not speed.

Clearly the best performer from the units tested here, and thus our Editor's Choice, was the Canon PIXMA MP780. The Canon's fast print time, extremely close reproduction (during scanning and

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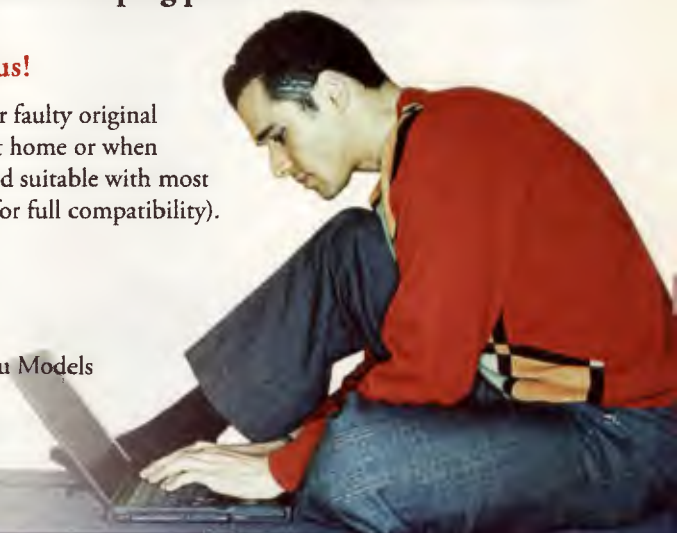
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copying), first rankings in scanning, text printing and copying, and second place ranking (in text reproduction in our "blind" rating by an impartial third party) are hard to argue with. You couldn't ask for anything more.

HP has carried off more than its fair share of APC awards for its printer lines, but the 3310's functionality is just a little too limited to carry off a Highly Recommended for this challenge. Though unquestionably outperformed by the Canon,

HP's MFP has shown extremely good quality prints, fast times and excellent image reproduction. The major downside to the unit is the lack of a document feeder, mandatory for sending off multi-page faxes.

The Brother MFC-5840CN takes out our Highly Recommended award: great quality prints (both in colour and black and white), good timing and all the right features proves it's a little beauty. The Epson model did OK in our book, but nothing more: questionable

scanning and colour photocopying quality, good text reproduction, but mixed in with the lack of a document feeder really puts this in the shadows. It's by no means a bad unit, nor a bad buy, but there's better available on the shelves.

Bringing up the last two spots were the brother and sister, Lexmark and Dell. The Dell, being a newer unit, seemed to outperform the Lexmark slightly, but not enough to pull itself out of a quagmire of mediocrity. The Dell's image quality and scanning

prowess were nothing to write home about, but its three-year warranty should suit business users to a T — although having to order ink online and wait for delivery from Malaysia could be a show stopper if you happen to run out just before a report is due to hit a client's desk. The Lexmark X7170, once again, didn't fair too well. With noticeably poor results in image quality for both text and images, and with an extremely poor showing in colour copy quality, it's best avoided. **ETC**

	BROTHER	CANON	DELL	EPSON	HP	LEXMARK
RATED SPEED BLACK / COLOUR (PPM)	20 / 15	25 / 17	24 / 19	17 / 16	32 / 31	22 / 15
MAXIMUM RESOLUTION (DPI)	1,200 x 6,000	4,800 x 1,200	4,800 x 1,200	5,760 x 1,440	4,800 x 1,200	4,800 x 1,200
INTERNAL NETWORK	No	No	No	No	No	No
PAPER SIZES	Letter, legal, A4-A6, index cards	Letter, legal, A4-A6, index cards	Letter, legal, A4-A6, index cards	Letter, legal, A4-A6, envelopes	Letter, legal, A4-A6, index cards, envelopes, labels	Letter, legal, A4-A6, index cards
PAPER INPUT (NUMBER OF SHEETS)	100	100 (est)	100	100	120	150
PAPER OUTPUT (NUMBER OF SHEETS)	50	50 (est)	50	50	70	50
PHOTO PRINTING / PICTBRIDGE	Yes / Yes	Yes / Yes	Yes / Yes	Yes / Yes	Yes / Yes	Yes / Yes
WINDOWS DRIVER	Yes	Yes	Yes	Yes	Yes	Yes
LINUX DRIVER	No	No	No	No	No	No
MAC DRIVER	No	Yes	No	Yes	Yes	Yes
INK BLACK / COLOUR	1 / 3	1 / 3	1 / 1	1 / 5	1 / 5	1 / 1
REPLACEMENT BLACK	Std \$29.70; high yield \$45	\$21.95	\$34.10	\$18.81	\$29.95	\$41.99
REPLACEMENT COLOURS	\$16.50 each CMY	\$24.95	\$38.50 (Tri-colour) / \$44.00 (Photo)	\$18.81 per colour	\$15.95 per colour	Std \$36.99; high yield \$49.99
INTERFACES (PARALLEL, USB, NETWORK)	USB	USB	USB	USB	USB	USB
SCANNER RESOLUTION	19200 interpolated 48-bit	9600 x 9600 interpolated	19200 interpolated 48-bit	2400 x 4800 48-bit	19200 interpolated 48-bit	19200 interpolated 48-bit
MEMORY CARD SUPPORT	SM, CF, MS, SD, xD	None	CF, MMC, SD, MS, SM, xD, USB Memory	CF, SM, MS, SD, MiniSD, MMC, xD	CF, MMC, SD, MS, SM, xD	None
FAX MODEM SPEED	33.6Kbits/s	33.6Kbits/s	33.6Kbits/s	33.6Kbits/s	33.6Kbits/s	33.6Kbits/s
INK CARTRIDGES	4	4	3	6	6	4
WARRANTY	1 year	1 year	3 year (next business day)	1 year	1 year	1 year
DIMENSIONS CM (W X D X H)	48.5 x 46.0 x 34.0	46.9 x 48.5 x 30.4	48.7 x 37.8 x 24.6	45.6 x 43.9 x 25.6	46.4 x 39.5 x 22	49.1 x 42.3 x 30.5
WEIGHT	10kg	13.6kg	9.9kg	10kg	12kg	9.3kg
						
	Good quality print	Great quality print	Fast print's	Fast scan times	Excellent images	Fast prints
	Slow printouts	No memory card support	Poor quality print	Slow printouts	No auto document feeder	Poor print quality
Verdict	★★★★☆	★★★★☆	★★★☆☆	★★★★☆	★★★★☆	★★★☆☆

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QoS VoIP routers

Stephen Withers checks out six routers that should improve your VoIP performance.

six

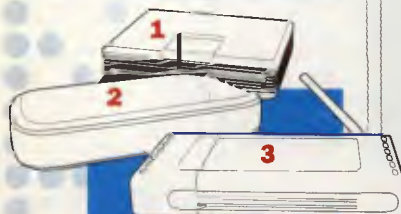
ROUTERS TESTED

RATED CRITERIA:

Ease of installation

Voice quality

Data throughput



THE players

First-generation VoIP adaptors brought simple and affordable Internet-based calling to the consumer and small office markets. All you needed to do was hook up the adaptor to the network switch or router, a phone to the adaptor, and connect the power pack. You could be enjoying your first cheap call within seconds.

But there was a snag. Depending on the codec, VoIP can use a fair percentage of the upstream bandwidth of low-end broadband connections. That means it's liable to be interrupted by simultaneous traffic. If a packet of data going from your email client

to a server takes a little longer than usual, nobody will detect the difference. Voice traffic, however, is extremely time-sensitive, and if a packet of voice data is delayed the listener will immediately notice.

The answer is to apply Quality of Service (QoS) rules so the voice traffic takes priority. All but one of the devices tested here have built-in VoIP adaptors, making the job relatively easy: if a packet from the adaptor is waiting, it forwards it, and only looks at the other ports if there are no voice packets waiting.

This works well as long as two conditions are met. Firstly, the link to the ISP must be sufficient for the

voice traffic, with enough left over to give data traffic the throughput you need. It's not that two simultaneous conversations will flood a 128Kbit/s link (apart from D-Link's DI-102, the products tested here all have two phone ports), as there will still be room for data packets to be transmitted between the voice packets, but prioritising voice means everything else will be delayed. This is especially noticeable when uploading a large file to an FTP server, for example.

A QoS router helps deliver better audio quality when other bandwidth-intensive applications are running simultaneously, but at

Vender	Model	Price	Online	Phone
1. Linksys	Sipura SPA-2100	\$149	www.linksys.com.au	1800 678 808
2. Netgear	TA612V	\$179	www.netgear.com.au	1800 502 061
3. D-Link	DVG-G1402S	\$299.95	www.dlink.com.au	1300 700 100



the expense of those other applications' performance.

The device applying QoS should be the last thing on your network before the modem. If not, QoS will not be applied to the packets introduced by the devices connected upstream. So, if your modem has a built-in router and switch, don't connect anything other than the QoS router to it.

Although QoS in your router will prioritise VoIP on the link to the ISP, you shouldn't expect voice packets to get priority in your provider's network or on the Internet as a whole. In practice this doesn't seem to be a major problem, as we found

QoS-enabled VoIP calls came close to the quality of PSTN calls.

Curiously, we found QoS improved the audio quality even when the network activity was otherwise very light (eg. only two active computers; neither doing anything other than background operations such as checking for email or time synchronisation).

The devices here were tested on an OptusNet cable connection with 256Kbit/s upstream bandwidth.

EASE OF INSTALLATION

If you already have a router, the hardware installation is easy: unplug the Ethernet cables from

the old one, plug them into the new one and then connect the power supply. The manufacturers' instructions usually recommend switching everything off before you begin, powering up the modem first, waiting for it to initialise, then the router (another wait) and finally the computers. We concur, as this ensures the modem collects the DHCP settings from the ISP, the router gets them from the modem, and then the computers get their settings from the router.

Given that these devices are often installed under desks or in cupboards, clear labelling of the various ports can be very helpful.

In good light, it doesn't make much difference, but we had problems with some. The Linksys WRT54GP2 has labels moulded into the case, which makes them very difficult to read, but layout means that isn't a big deal. The Netgear TA612V has a printed label on the base — the print is on the small side and the ports are strangely numbered from



Vendor	Model	Price	Online	Phone
4. NetComm	V300	\$199.10	www.netcomm.com.au	(02) 9424 2000
5. Linksys	WRT54GP2	\$239	www.linksys.com.au	1800 678 808
6. D-Link	DI-102	\$169.95	www.dlink.com.au	1300 700 100



right to left. In addition, the phone sockets are upside down compared to the Ethernet sockets. The Linksys Sipura SPA-2100 has small, low-contrast labels beneath the colour-coded ports. Its activity lights are also on the back panel. The very compact D-Link DI-102 also uses colour coding, and the contrast is reasonable (though the text is smaller than we'd like). Its stablemate, the DVG-G1402S has larger and clearer labelling, and all the connectors are aligned the same way. It's just a shame the ports are numbered from right to left. The NetComm V300 gets our

or ADSL, and whether you are using the VoIP account bundled with the hardware. VoIP setup is reasonably straightforward if you work methodically, but variations in terminology used by different companies can be confusing — buying a device with a bundled VoIP account gets around this.

Whatever else you do, set a new password on the router to prevent unauthorised tampering.

The Netgear TA612V comes with QoS disabled. According to a Netgear spokesperson, this is because different customers have varying needs. It can be

The NetComm V300: well-priced, good voice quality, and easy to set up.

can be set (high or low) for FTP, HTTP, Telnet, SMTP, POP3, and for up to three specific TCP ports to cater for other applications. Traffic on the three Ethernet ports can be categorised as low or high, with optional rate limiting to ensure one computer (or group of computers, if you attach a switch to a router port) doesn't grab more than its fair share of the bandwidth.

We ran into a problem trying to configure the Linksys Sipura SPA-2100, as attempts to change the settings generated "403 Forbidden!" messages. Changing the browser from Internet Explorer to Firefox solved that one. The Sipura interface presents the settings in larger chunks than most, which can be overwhelming. QoS was disabled by default; a particular problem as there's nothing in the documentation about enabling QoS, and the alternatives are CBQ or TBF. According to a Linksys engineer, TBF (Token Bucket Filter) is the go.

NetComm's V300 has a well-organised Web interface. There's no wizard, but if you work through the first four sections you won't go far wrong. QoS is not enabled, but the fourth item on the navigation bar is VOIP QoS, so it's not hard to find. The D-Link DI-102 is the odd man out in this collection of products, as it is neither a router nor a VoIP adaptor. Instead, it installs between a router and a modem to prioritise voice packets.

We tested it with a DI-824VUP+ router and an engine Voice Box (Sipura SPA-2000). By default, the DI-102 is self-configuring, automatically determining the speed and type of Internet service. A simple Web interface provides access to the limited number of settings.

VOICE QUALITY

Voice quality was consistent across all the routers with built-in VoIP adaptors. With QoS enabled, it's better than mobile-to-landline, but not quite as good as landline-to-landline. Without QoS, the perception was of slightly lower quality (on a quiet network), but dropouts were a real problem when we loaded it with traffic.

The D-Link DI-102's automatic configuration overestimated the upstream bandwidth of our cable connection and therefore did not provide sufficient throughput for the VoIP traffic. This resulted in dropouts during file uploads. When we manually set the upstream bandwidth to reflect the actual bandwidth, the dropouts disappeared.

DATA THROUGHPUT

We tested data throughput by uploading a 900KB file to the ISP's FTP server. With QoS disabled and no voice traffic, the times were all very similar.

Turning on QoS made a big difference to some devices' performances. The Linksys Sipura SPA-2100 took about twice as long once QoS was activated, but adding voice traffic only slowed it slightly after that.

QoS initially made no difference to the Linksys WRT54GP2's throughput (without voice traffic), provided the MTU setting was left at the default 1500. However, the transfer took almost twice as long while a call was in progress. Linksys's recommended MTU of 580 slowed the transfer significantly.

The D-Link DVG-G1402S was problematic. Without voice traffic, the file transfer was as fast as the

“ QUALITY OF SERVICE (QoS) RULES ENSURE THAT VOICE TAKES PRIORITY OVER OTHER TRAFFIC

vote for the clearest labels, consistently aligned connectors and left-to-right port numbering.

Plugpack size can also be an issue in cluttered environments. The Linksys WRT54GP2, Netgear TA612V and D-Link DVG-G1402S use traditional designs that take up more than one space on a powerboard, while the D-Link DI-102, Linksys Sipura SPA-2100 and NetComm V300 have more modern, slimline plugpacks.

Once the hardware is set up, configuration is carried out via a Web browser. How closely the defaults match your needs depends mainly on whether you're on cable

auto-provisioned by the major VoIP providers, although none of them do so at present.

The D-Link DVG-G1402S's wizard steps you quickly through the network setup process, and QoS is enabled by default.

The Linksys WRT54GP2 has a Windows-only wizard on the CD-ROM, instead of it being built-in to the Web browser, but its use is optional. The double-tabbed Web interface initially seems busy, but we quickly became used to it and found it easy to navigate. Some advanced settings are accessible only through a "hidden" page. Voice QoS is on by default, and QoS

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* engin Voice Box or Softphone, broadband internet connection and Ethernet modem/router may be required. Broadband access, other phone service provider fees excluded. Quality of service may vary with choice of broadband/speed. engin Voice Box RRP \$149, minimum monthly plan \$9.95 plus call costs. Calls may attract separate ISP charges. Call charges include GST and are rounded up to the nearest cent before GST. 10 cents applies to local and national calls in Australia. Timed calls are billed for the first minute, thereafter billed per second. engin Voice Box is soft coded to function with engin networks. 3.5 cent countries include UK, Ireland, USA, Canada, China, Hong Kong, Singapore, Taiwan, Germany & New Zealand subject to change without notice. Higher rates may apply for calls to mobile phones. Credit card or charge card billing only. Subject to credit approval. For other charges, monthly billing details and our Standard Form of Agreement go to engin.com.au. ^A For more details on engin Voice Box \$100 cash back offer visit www.engin.com.au/documentation/cashbackoffer.pdf. ACP01



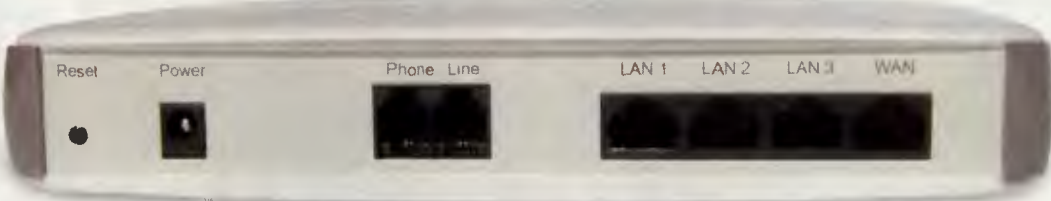
other routers. Yet, when an FTP transfer started while a call was in progress, it was the slowest by a big margin and the slow speed continued after the call was terminated. This seemed anomalous, so we checked with D-Link. The company confirmed our results and put the finger on the pre-release firmware in the review sample, assuring us it would be fixed before units ship to customers.

We previously mentioned that we had to manually set the upstream bandwidth on the D-Link DI-102, but this resulted in the file transfer taking eighteen times longer than with the default setting. The default gave throughput equivalent to the router alone, but at the cost of voice quality.

The NetComm V300 was a strong performer. The QoS penalty was just 20% with no voice traffic, and around 35% while a call was in progress.

The Netgear TA612V was the pick of the bunch when we used an MTU of 1500 as recommended by a Netgear engineer (rather than 580 as specified in the help text). Activating QoS had no noticeable effect on throughput; a voice call imposed a penalty of less than 10%.

Our conclusion is that while QoS results in clearly improved voice quality, it often comes at a cost.



Baby got back: if you already have a router, hardware installation is easy (just remember to power up your modem first).

It's obvious that prioritising VoIP traffic means that other packet types may be delayed, but there are wide variations in how well the different devices handle the task.

OTHER FEATURES

With two exceptions, all the devices tested have two phone ports. As previously mentioned, the D-Link DI-102 is intended for use with external VoIP adaptors. While the NetComm V300 has one phone port, it is unique among these products for the provision of a phone line connection. This means VoIP and landline calls can be made or received using a single handset, and it also allows outgoing calls when the Internet connection or VoIP provider are down. 000 calls are automatically routed through the landline.

The D-Link DVG-G1402S and the Linksys WRT54GP2 are both 802.11g/Ethernet routers; the others are Ethernet only. The NetComm V300 and Linksys

WRT54GP2 have three Ethernet ports, the D-Link DVG-G1402S has four, and the Netgear TA612V and Linksys Sipura SPA-2100 are single-port devices that would normally be used with a switch.

As this is primarily a test of VoIP and QoS features, we won't catalogue all the router features such as firewalls and filtering. If that sort of thing is important to you, check the manufacturers' specification sheets.

THE VERDICT

We'd prefer to reserve judgment on the D-Link DVG-G1402S until the firmware is finalised. The company was brave enough to provide a pre-release sample, but the performance just wasn't there. Wireless capability and four Ethernet ports make it the connectivity leader.

It's hard to see a niche for the D-Link DI-102. If it was about half the price, it could be worthwhile for those who already own a VoIP

adaptor and an Ethernet router (but want to add QoS for improved voice quality). As it is, you might as well buy the Linksys Sipura SPA-2100 and get a two-line VoIP adaptor and better throughput for less money. Indeed, the SPA-2100 is almost as cheap as some single-port VoIP ATAs (analogue telephone adaptors) while delivering good voice quality and reasonable data performance.

The Linksys WRT54GP2 has a useful feature set if you want Wi-Fi (including support for WPA Radius in addition to PSK), good filtering and flexible non-VoIP QoS.

Netgear's TA612V is a good performer and well priced, and therefore takes our Best Value award. The single Ethernet port is its main shortcoming — an external switch just adds to the clutter.

Our Editor's Choice goes to the NetComm V300. It's reasonably priced, delivers good voice quality and data throughput, and is easy to set up. **APC**

	D-LINK DI-102	D-LINK DVG-G1402S	LINKSYS SIPURA SPA-2100	LINKSYS WRT54GP2	NETCOMM V300	NETGEAR TA612V
VOIP PORTS	0	2	2	2	1	2
PSTN FAILOVER	No	No	No	No	Yes	No
ETHERNET PORTS	1	4	1	3	3	3
802.11G	No	Yes	No	Yes	No	No
✓	Simple installation.	Four Ethernet ports.	Compact.	Full-featured.	PSTN failover.	Best performance.
✗	Poor data throughput.	Performance questions from pre-release firmware.	Daunting setup.	Mid-range performance.	Single VoIP port.	Single Ethernet port.
Verdict	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★★	★★★★★



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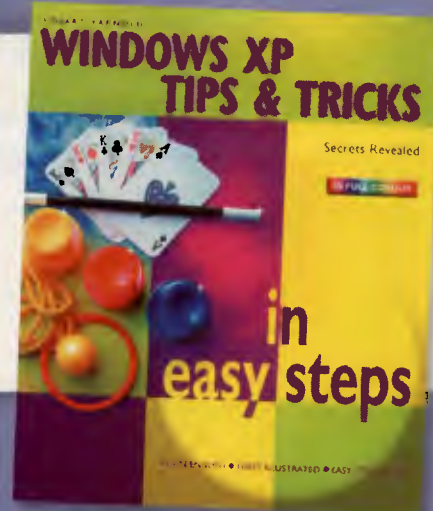
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MULTI-FUNCTION DEVICES





High definition and flat: the ideal TV

Flat is the new black in home entertainment and, after taking the office by storm, LCD displays are making a push into the lounge room. Adam Turner looks over the best flat TV offerings.

LCD TVs are a perfect example of the convergence of home entertainment and computing, paralleled by a blurring of the lines between business and pleasure. Are they wide-screen monitors with a TV tuner or wide-screen TVs that can connect to a computer? It all depends on whether you're playing while you work or working while you play.

Just as the rise of LCD has rendered unwieldy CRT monitors an endangered species, LCD is making its presence felt in the Australian TV market. LCD TV sales almost quadrupled in the last 12 months; they now make up seven per cent of all TV sales and 16 per cent of money spent on TVs.

Digital television is preparing for its next big push into Australia's lounge rooms. It offers the perfect excuse to upgrade your bulky, old picture tube for something slim and sexy like an LCD TV. Of course, any

new technology isn't complete without a range of confusing formats. Standard definition (SD) digital offers roughly the same picture quality as analogue television, but mostly in 16:9 widescreen like a DVD, rather than traditional 4:3 broadcasts. Digital also eliminates signal problems such as ghosting, but the downside is that poor reception can cause the image to freeze — unlike analogue which just goes fuzzy when the signal is bad. Digital TV also offers better sound, so think about putting some money aside for a surround sound amplifier and speakers.

The Government originally intended to pull the plug on analogue broadcasts in 2008, but slow take-up means this will be pushed back. When analogue broadcasts cease, the digital signal will be boosted, which should help with reception problems.

SANYO LCD27XRI



At 68cm, the Sanyo LCD27XRI is about as big as it gets in sub-\$2,000 land.





You can watch SD digital on any television connected to an SD digital set-top box, which now sell from under \$200. Still, one of the big promises of the digital television revolution is high definition (HD). Digital television's rocky start in Australia was partially due to the exorbitant cost of HDTVs and SD/HD set-top boxes capable of displaying better-than-DVD quality. LCD TVs are now putting the amazing clarity of HDTV within the reach of the masses.

HDTV comes in three flavours: 576, 720 and 1080 — according to the number of horizontal lines in the image. This number is followed by an "i" for interlaced or "p" for progressive (and sometimes by the number of frames per second: usually 50 or 60). Interlaced only displays every second horizontal line, rapidly switching between the odd and even numbered lines to

build the entire image. Progressive displays the entire image at once, creating a sharper picture.

In most countries 576 isn't considered true HD, just as 256Kbits/s Internet access isn't considered true broadband. In Australia, SD is 576i and HD comes in 576p, 720p and 1080i. In comparison, DVD is 480i or 480p, depending on whether your DVD player and TV can cope with progressive scan. Currently all television stations simulcast in analogue and SD, with at least 20 hours per week also broadcast in some form of HD. The Nine Network broadcasts in 1080i with Dolby Digital 2.0 or 5.1 sound, while Ten offers 1080i with only Dolby Digital 2.0. Seven only transmits in 576p with MPEG or Dolby Digital 2.0 sound. The ABC and SBS are allowed to "up-convert" SD 576i to 576p, the ABC using



SANYO LCD20XRI



SANYO LCD37XRI

Dolby Digital 2.0 or 5.1 and the SBS using MPEG.

LCD TVs aren't cheap: "entry level" still means under \$2,000, but if you need change from \$1,200 there are a few options. Don't forget these are only recommended retail prices, so shop around.

At this price, don't expect them to have built-in digital tuners; you'll still need a SD/HD set-top box. You'll also struggle to find screens bigger than 58cm (fine for a second TV or high-end PC monitor, but probably won't cut it in your lounge room). Remember, televisions are measured diagonally, so a 58cm wide-screen picture isn't as high as a 58cm 4:3 picture.

ENTRY LEVEL (LESS THAN \$2,000)

Hitachi, NEC, Philips, Sanyo, Schaub Lorenz and Sony all make 1080i HD-ready LCD TVs for under two grand.

If you're on a tight budget, Sanyo's 50cm LCD20XRI retails for \$999 — but remember you still have to spend a few hundred dollars on a SD or SD/HD set-top box or tuner for your computer. This unit's component and VGA inputs mean you can connect to a HD signal from either, but at this size the LCD20XRI is really better suited to occasional TV watching (rather than taking pride of place in the lounge room).

The LCD20XRI offers progressive scan with 800:1 contrast ratio, 400cd/m² brightness, a 160 degree horizontal viewing angle and eight millisecond (ms) response time, which isn't bad for a computer monitor, but only just makes the grade as a television. Time for a quick jargon buster: contrast measures the display's brightness at full white compared to full black — the higher the better. Brightness



WALL MOUNTS

If you're going for the ultra-modern look, or just struggling to make space for your sexy new display, you should consider mounting it on the wall.

Most LCD displays up to 81cm have standard 75mm or 100mm VESA mounting points on the back, giving you plenty of options when it comes to mounting them on walls, from the ceiling or on a swing arm.

Any LCD panel bigger than 81cm should still come with a VESA or proprietary mounting option – but be sure to look into it before you hand over your money. If the store can't help you, Australian panel mounting specialists Atdec (www.atdec.com) offer a range of consumer and commercial mounting options catering for panels up to 140cm and 60kg. Many allow you to tilt and swing the display.

Mounts range from \$145 to \$299, which may include an articulated arm. They come with installation instructions, but it's probably a good idea to get larger units professionally installed. That way, if you end up with your panel face down (and an unexpected window or skylight) you have someone else to blame.

Apart from attaching the mount securely to the wall, you'll probably have to do some replastering as well, unless you want unsightly cables snaking their way up your wall to the display.

is measured in candelas per square metre (cd/m^2); again higher is considered better. Viewing angle is how far you can stand to the side before the picture vanishes — an annoying trait of LCD technology. Response time measures how fast a pixel can change from black to white and back again (slower than 8ms usually means that objects can blur as they race across the screen).

NEC's NLT 17WF and Sony's MFMHT75W both tip the scales at 43cm and \$1199. Again, at this size they are glorified computer monitors rather than televisions. Both have VGA and DVI monitor inputs and offer $450\text{cd}/\text{m}^2$ brightness. The NEC offers progressive scan and even throws in a FM radio, but it lacks the Sony's component input and only provides 450:1 contrast ratio compared to 800:1. Both sport a sluggish 16ms response time.

Creeping up towards the \$2,000 mark amongst TV manufacturers there are Samsung's LA23R51BX (\$1,699) and Sony's KLV523A10 (\$1,899). At \$1,999 you'll find Hitachi's 26LD8000TA, Sanyo's LCD27XR1, Samsung's LA26R51BX, Schaub Lorenz's VMD-2600P and Philips' 23PF9946.

The Sanyo, at 68cm, is about the biggest television you'll get in this price range. The Schaub Lorenz, Hitachi and Samsung LA26R51BX measure in at 66cm, with the others around the 56-58cm mark. They all offer progressive scan, viewing angles of at least 170 degrees and VGA inputs.

If you want to play it by the numbers, the Philips is the first one you'd cross off your list because of its size-to-price ratio, 16ms response time, 400:1 contrast ratio and $450\text{cd}/\text{m}^2$ brightness. This is where you have to make a decision.

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SCHAUB LORENZ VMD-2600P

Do you want a cheap television or a good cheap television? Philips make very good televisions, but, as always, you get what you pay for. If you want a top notch Philips television then you're shopping in the wrong price bracket. Also, the numbers aren't everything. You might find when you get to the store that the quality factor that a respected brand like Philips or Sony brings to the table more than compensates for the lower specs such as response time. Warranty or other fine print may also be better.

The Sony manages to get the response time down to 10ms and the brightness up to 500cd/m² with an 800:1 contrast. If you want a higher-end Sony then you'll need to dig a little deeper into your pocket.

The rest of the 66cm units offer 8ms response times. Samsung's LA23R51BX offers good value at \$1,699, but for another \$300 the Samsung LA26R51BX gets you more screen real estate. Both offer 3,000:1 "Dynamic Contrast Ratio" (a Samsung-developed term; not the same as standard contrast ratio).

Very little on the spec sheet separates the 66cm Samsung from the Schaub Lorenz and the Hitachi, except they both have two 10W speakers compared to the

Samsung's 5W speakers. All have a wide range of inputs, including two component inputs so you can connect a DVD player and digital set-top box at the same time.

If size matters, Sanyo's LCD27XRI wins at 68cm and also ups the

contrast to 900:1 (and the brightness to 550 cd/m²). It also sports two 6W speakers, but is let down by a 16ms response time.

A key differentiator amongst this bunch is the digital inputs. The 66cm Samsung has the new High

Definition Multimedia Interface (HDMI) input — combining high-definition audio and video in the one cable. The Schaub Lorenz offers a DVI input with High-bandwidth Digital Content Protection (HDCP) and the Sanyo offers HDCP-compatible HDMI. HDCP encrypts the transmission of digital content between the video source and the digital display (supposedly to improve the signal quality, rather than as an anti-piracy measure). HDCP is expected to be built into Vista, the next version of Microsoft Windows, and if you don't have a HDCP-compatible monitor then HD content will probably be downgraded to SD.

If you're after a sub-\$2,000 LCD TV from one of these traditional TV manufacturers then these last three 66cm models and the 68cm Sanyo should be on your shortlist. Even so, at this screen size, nothing here cuts the mustard as a lounge room home theatre television. As such, monitor makers such as Acer, BenQ and Viewsonic can offer good value for money and greater screen sizes.

Acer's 66cm AL2671W (\$1,599) looks a better choice than BenQ's 66cm DV2680 (\$1,699). It has a 170 degree viewing angle compared to the BenQ's 85 degrees, but both have 16ms response times.

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IF YOU'RE SERIOUSLY CONSIDERING DROPPING FIVE BIG ONES, YOU NEED TO ASK SOME HARD QUESTIONS FIRST

Viewsonic's massive 81cm N3260W comes in at \$1,859 and is in a class of its own at this price. Inputs include HDCP-compatible HDMI, VGA, SCART and component video, plus it sports two 10W speakers. Vital stats include 500cd/m² brightness, 800:1 contrast ratio, 170 degree viewing angles and 8ms (grey-to-grey) response time.

If you're considering buying something in this price range for use primarily as a TV, look closely at the 68cm Sanyo and perhaps the 81cm Viewsonic. If you're more concerned about image quality than screen real estate you should look at the displays from television manufacturers, but you should also look on the other side of \$2,000.

MID-RANGE (\$2,000 — \$5,000)

Once you cross the \$2,000 threshold the competition really opens up — with JVC, LG, Loewe, Panasonic, Sharp, Teac and Toshiba amongst those entering the fray. From here in you can probably get a HD set-top box thrown in for free.

The \$2,000 to \$5,000 price range is where most LCD TV buyers will be looking if they want something to grace their lounge room rather than their study. Sizes range from 66cm to 100cm but the majority are 81cm. This is about the smallest size you'd want for decent home theatre, producing roughly the same-sized 4:3 image as a 68cm 4:3 television.

If only the biggest will do, Viewsonic is again hard to beat with its gigantic 100cm N4060W for \$4,399 (and the slightly more subdued 94cm N3760W for \$3,399).

LOEWE INDIVIDUAL 32



PANASONIC TX-32LX500A



Viewsonic also offers the cheapest 81cm with the N3260W at \$1,859. At \$5,000, JVC, LG, Toshiba, Sharp, Schaub Lorenz, Hitachi, Philips, Sanyo and BenQ are prepared to go up to 94cm.

If you're forking out this kind of cash then the "nice to have" features in the sub-\$2,000 range should really come standard, such as a low-response time and at least 500:1 contrast and 500cd/m² brightness. At least one HDMI input should be included and you want a raft of others such as composite, component, S-Video and SCART as well as VGA and DVI.

Now is the time to start paying more attention to speakers, since you're looking to rock the lounge room rather than the study. Even if you intend to sink some serious dough into a surround sound system, you won't want to power it up every time you turn on the telly, so good built-in speakers are important. Don't stand for tinny, PC-like speakers in this price range — you want something with decent bass that won't distort when you crank it up.

Other useful features are two tuners, for picture in picture, and a USB and/or memory card slot so you can view digital photos, music and even movies. At this size and beyond, you might find the TV is actually just a panel and the TV tuner is part of an external "media box".

LG's 81cm (\$3,999) and 94cm (\$4,999) LCD TVs are worth a look

as they come with a built-in analogue/SD/HD tuner along with 1200:1 contrast and 500 cd/m² brightness. Both have 8ms response times and HDCP-compatible HDMI, plus the 94cm unit has a 9-in-2 memory card slot.

Panasonic's 66 and 81cm models, from \$2,599 and \$3,299, offer 14ms response times. They also sport built-in analogue/SD/HD tuners, HDMI and 6-in-1 memory card slots.

Loewe's offers a number of 66 and 81cm LCD TVs with integrated SD digital tuners, such as the 81cm Loewe Individual 32 for \$4,499, but you'll still need to purchase a set-top box if you want HD. The Panasonics, LGs and Loewes with digital tuners have digital audio outputs for connecting to a surround sound amplifier.

The 81 and 94cm Hitachis (three models ranging from \$2,699 to \$4,999) feature an SD card slot and a USB port.

TOP SHELF (OVER \$5,000)

If your credit card is up for some serious punishment, you can venture beyond \$5,000. Sony's 81cm KLV32M1 will set you back \$5,999. Or, for a mere \$7,999, you can be the proud owner of Sony's 81cm KLV32S2 which has "designer glass" — if that's the kind thing that floats your boat.

So, apart from designer glass, what are you paying for? One is brand name. Another is image

quality, and that's something you can only judge on the shop floor.

Venturing into a television store with five grand in your hand is a risky business. Some stores use tricks such as cranking up the brightness and colour, hoping you'll mistake vivid for sharp. Playing cartoons, such as anything from Pixar, is another common practice as they make even average televisions look razor sharp. Watch out for stores that don't configure display models properly, such as stretching a 4:3 image across a 16:9 screen. Do you really want someone who can't even set up a wide-screen television telling you the best way to spend your hard-earned savings?

If you're looking to fork out more than \$5,000, you're left with mostly 94cm and 100cm models from companies like LG, Loewe, NEC, Philips, Samsung, Schaub Lorenz, Sony and Toshiba. Again, if you shop around, some of these models might sneak in at under \$5,000.

If you're seriously considering dropping at least five big ones on the mother of all televisions, you need to ask yourself some hard questions first. Why so big? Just because you can squeeze a 100cm monster into your tiny lounge room doesn't mean it's a good idea. While it may not bother you, it might

bother your better half. As a rule of thumb, they say it's uncomfortable to watch a screen wider than half the distance between the couch and the television. Living with someone who hates the bloody thing can also be uncomfortable, so consultation and compromise is a good idea.

To spend more than \$5,000 on an LCD TV you could be up for a visit to a specialist audio visual store

rather than your bulk discounter. You won't find many LCD TVs over \$5,000 or 94cm when flicking through your junk mail, except for the occasional Sony.

Another hard question: why LCD? At these prices you also have to consider plasma, rear projection and perhaps even a projector. For raw size, all three offer more bang for your buck than LCD. Bigger LCD panels also struggle to keep down

response times, so you might get less blur from a different format. If you're looking at plasma, be sure to consider Fujitsu and Pioneer (plus the other brands mentioned here).

If you're ready to embrace the high definition digital revolution with style — and you've already answered the hard questions — then a slim, sexy, HD-ready LCD TV could be destined for your lounge room. **BT**



SONY KLVMR32S2

WHAT TO LOOK FOR WHEN BUYING A FLAT PANEL TV

When buying a HD-ready LCD TV, the same rules/clichés apply as with all shopping expeditions. You get what you pay for. Know your stuff: research some brands, features and prices before you walk into the store. If the spec sheet doesn't list a specific feature, it's either not included or probably so bad they don't want to talk about it.

If HDTV has inspired you to go LCD, make sure to buy a wide-screen TV so you don't have to watch movies "letterboxed" with black bars at the top and bottom of the screen. The downside is 4:3 programs appear with black bars on either side.

Televisions are measured diagonally, so a 60cm widescreen picture isn't as high as a 60cm 4:3 picture. You'll want to go up a size to

make sure a 4:3 picture is the same size on your new widescreen TV as it was on your old 4:3 TV.

Think carefully before buying a widescreen TV bigger than 81cm. You don't want something that dominates the room. As a rule of thumb, your screen should be no wider than half the distance between the couch and the television. Any wider and you're going to strain your neck as you constantly turn to see the entire screen.

At these sizes, it pays to measure your lounge room wall space to avoid tears when your new behemoth is delivered (unless you intend to keep it on the veranda). Also, look at what kind of stand is included — a swivel stand can be handy. You could consider mounting it on the wall, but

that's something probably best done by a professional to avoid tearing yourself a new window.

After size, one of the most important features of LCD is response time, measured in milliseconds. This is how fast a pixel can change from black to white and back again (slower than 8ms means that objects can blur as they race across the screen). A good cathode ray tube (CRT) is comparable to about a 6ms LCD, so the new generation of fast panels are another nail in the coffin of the bulky picture tube. Some vendors measure response times in "grey to grey", or how long it takes to change colour shades. The bigger LCDs struggle to keep response time down, but can sometimes compensate in other ways.

Generally, aim for higher brightness, greater contrast and wider viewing angles — these are important specs to bear in mind.

You'll want a raft of inputs such as composite, component, S-Video and SCART, as well as VGA, DVI and HDMI for connecting to your current and future AV components. Remember to allow for a VCR, DVD/Blu-ray/HD-DVD, PVR, games console, digital set-top box, home theatre PC and whatever other must-have home theatre component they dream up next.

Useful features include built-in twin tuners (HD if possible) for watching picture in picture, a multi-format memory card reader and a VGA or DVI input for connecting to your lounge room computer.

Super Fast Broadband

Another world of speed

While fast broadband for most consumers means “high-speed” connections of 1.5Mbit/s, power users are gravitating toward ADSL2+, which breaks the 8Mbit/s barrier of unrestricted ADSL and can reach theoretical speeds of 24Mbit/s close to an exchange.

The first wave of ADSL2+ customers are still early adopters, but Internet service providers rolling out the technology are seeing the signs of ADSL2+ becoming mass market. They also say that ADSL2+ threatens to change everything, from the way you get your entertainment to how your office is networked.

There are still only a few ISPs that offer ADSL2+, but that’s about to change, as bigger players plan their entry into the market. *APC* reports.



IN THIS COVER STORY

Page 75: We check out the state of the ADSL2+ rollout and why it's taking so long.

Page 80: The best superfast broadband plans.

Page 86: Our regular broadband directory.

Superfast speeds slow rollout

Superfast broadband is already available in select exchanges in every capital, thanks to pioneers Internode and iiNet — but now the biggest ISPs are getting ready to move as well. *Tony Sarno* charts the progress of the ADSL2+ rollout.

Speed is taking over. Australians are migrating to broadband from dialup at an unprecedented rate. Broadband subscribers increased by 108% in the year to June 2005, from 1.048 to 2.183 million. But in reality, those moving to 1.5Mbit plans are getting an old ADSL technology restricted to an artificially low speed by Telstra, which makes Australia's common "high-speed" broadband seem like something from a bygone era (when compared to the speeds available to some of our South East Asian neighbours).

The closest to true fast broadband for most Australians is still cable Internet, with both

Telstra's and Optus' offerings reaching theoretical speeds of 10Mbit/s and now including plans with 20GB download limits. But cable's upload speeds of up to 256Kbit/s aren't exactly superfast.

Only one technology is ushering in true, downstream and upstream superfast broadband: ADSL2+, which was first launched last March by the pioneering Adelaide-based ISP Internode. ADSL2+ has a sliding scale of speed depending on how far you live from the exchange. Up to 24Mbit/s is theoretically possible if you're within a few hundred metres of the telephone exchange (and have perfect line



"In our experience to date, the 'early adopter' market is pretty significant," says Internode's MD, Simon Hackett.

conditions). It slows to around 2Mbit/s and less if you're 5km or more away. Upload speeds of 1Mbit/s are standard. Internode's ADSL2+ rollout was soon followed by iiNet's, with its Broadband2 product line. Broadband2 is a brand name for iiNet's version of ADSL2+, which was originally capped at 12Mbit/s but was uncapped recently.

But while ADSL2+ launched last March, it's still not widely available, present in only a fraction of telephone exchanges and available nationally in metro areas from only two ISPs. ADSL2+ is virtually non-existent in more remote rural centres except for some pockets in northern NSW and regional South Australia.

One reason for this is Telstra. Since most of Australia's ISPs resell Telstra's broadband ADSL infrastructure, many also expect to be reselling Telstra's ADSL2+. There's just one small hitch: Telstra isn't making ADSL2+ available to anyone yet. The telco hopes to have most of its exchanges enabled with ADSL2+ by the middle of this year (2006), but isn't yet selling ADSL2+ through its retail or wholesale arms.

The telco's refusal to articulate its ADSL2+ wholesaling intentions (late December 2005 at time of writing) worries many ISPs — both small players who cannot afford to install their own ADSL2+ capable DSLAM (DSL Access Multiplexer) technology in exchanges, and bigger ISPs which cannot justify rolling out ADSL2+ to country exchanges.

Internode, iiNet and some regional providers and wholesalers such as Adam Internet, Amnet, OntheNet and TSN Internet,

have been offering ADSL2+ by installing their own DSLAMs in telephone exchanges.

But even if the rest of the large ISPs and telcos have not rolled out ADSL2+ yet, they have been watching the market developing and many are planning ADSL2+ rollouts in 2006.

One is iPrimus, which began installing ADSL2+ ready DSLAMs in exchanges earlier in 2005. Spokesperson Bob Bowden says iPrimus has enabled close to 200 exchanges, aiming for 300 Australia-wide by the third quarter of 2006.

TPG Internet has also been installing its own ADSL2+ capable DSLAMs. TPG Internet marketing team leader Fiona Tong says TPG will enable up to 200 exchanges and release ADSL2+ in a two-phased approach, first to major cities, then some regional areas.

NSW broadband provider Exetel is working with three other companies to provide ADSL2+ DSLAM access. A spokesman says: "Exetel is currently planning to offer ADSL2/2+ speeds of up to 20Mbit/s to some 15% of ADSL users from around mid-2006. The coverage is expected to increase to around 25% of Australian users by mid-2007. . . Exetel doesn't expect to be able to offer ADSL2/2+ outside metropolitan areas of State capitals and the ACT in the near future."

OptusNet — to which many smaller ISPs are looking as a potential wholesaler — isn't saying when it will roll out ADSL2+, but a spokesperson points out that the \$150 million network rollout announced in September includes the installation of ADSL2+ ready DSLAMs in around 340 telephone exchanges. Whirlpool.net.au broadband expert,

Phil Sweeney, says providing ADSL2+ is a big move for the big players, hence their tardiness: "Someone like AAPT can't just enable a couple of exchanges. They need to roll it out in a big way when they do." (AAPT told APC it had no plans to rollout ADSL2+ at this stage).

Another reason is that some large providers want to deliver ADSL2+ using ULL (Unbundled Local Loop). The ULL is a regulatory framework in which Telstra leases the unconditional copper line so its competitors actually get to "own" the raw copper from their own DSLAM in the exchange to the customers' premises and are able to provide telephony services as well as broadband. The final details of the ULL arrangement — including pricing — are still the subject of a legal battle between Telstra and the Government.

"The offering of both phone and broadband (or the triple-play if you include video) is the ultimate goal, and you need ULL for that," Sweeney says.

Rather than wait for ULL, Internode and iiNet have been providing ADSL2+ access via LSS (Line Spectrum Sharing), which enables one carrier to provide telephony and another broadband over a single copper line.

No demand for faster speeds?

ISPs who won't be transitioning to ULL (or who can't afford to roll out their own ADSL2+ infrastructure in exchanges) comfort



iiNet's MD, Michael Malone, "customers really do want the higher speeds."

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BEAT THAT: iiNet's \$249 modem is a special all-in-one model by Belkin (F1PI241EGau) that includes 802.11G Wi-Fi, two VoIP ports, four 10/100 Ethernet ports and an ADSL2+ modem.



themselves with a belief that the demand for ADSL2+ does not appear to be huge, judging by requests for it from their existing ADSL and dialup user bases. There are even theories that the very fast speeds are overkill for a mass market which may be happy with 1.5Mbit/s.

Indeed, even some of the big players appear reluctant to launch ADSL2+ without a killer application such as video content. iPrimus won't commit itself to a launch date for ADSL2+ because it wants to put together an ADSL2+ package that may include IP TV.

iiNet and Internode's experience is that ADSL2+ speed is a big driver by itself, certainly with early adopters.

iiNet's managing director, Michael Malone, says: "We had 14,000 blink customers move to broadband2 in the month after release. So I reckon the customers really do want the higher speeds. A year ago, this wasn't so clear, but today, over two thirds of new customers are citing speed as the reason they chose iiNet."

"Fundamentally our offer is 'higher speeds for the same price', which is hard to pass up. In the future, I think this will change, and other features such as content will become important."

Internode's managing director, Simon Hackett, says that while ADSL2+ is in the classic early adopter phase, the number of subscribers is growing rapidly. "In our experience to date, the 'early adopter' market is pretty significant. Currently pretty much all the ports we can build

are being filled with customers. ... So while the market is currently populated with early adopters, it's way more than a trickle. From our point of view, ADSL2+ is definitely going to be mass market, for one part of the market — the part that appreciates that broadband is more than just a \$29.95 permanent dialup link at 256Kbit/s."

Hackett says the usage patterns of Internode's customers have made it clear that the big attraction of ADSL2+ is not the big download limits. It's the savings in time that the extra speed allows.

"The key here is not so much that customers, in general, will suddenly start downloading enormously more data than they did before — though the average keeps rising. It's more that when you want it now, you get it now," he says.

Hackett said it was a fallacy (propagated by some people whose downloading habits are insatiable) that there is no such thing as a fast-enough Internet link or a large-enough quota.

"In the real world, like the water or power pipes, you need them large enough for peak demand and you need to be able to buy the quota of stuff you need at a tenable price. ADSL2+ makes a huge positive impact on the pipe-size part of that equation."

"Well-connected Web sites just 'blink' and the page is there. Streaming video from sites with a global data distribution strategy, like Apple (partnered with Akamai), stream video to

your computer so smoothly and rapidly that video moves from a 'download' to an 'on demand' viewing decision — which is quite a substantial difference in the manner in which you interact with Internet hosted video content."

Hackett believes a substantial "sleeper" benefit for ADSL2+ is the upstream speed.

"1Mbit/s is the upstream speed most customers with an Internode Extreme plan experience. For technical reasons inherent in the design of ADSL in general, the upstream is good for 0.8 to 1Mbit/s in almost all cases. It's only been constrained to less, artificially, by Telstra on their DSLAMs."

"That higher speed upstream makes a huge difference. It makes file sharing viable in a whole new way. It makes mounting the file server in the office viable at last. It makes sending large files to customers from your home office viable. In a lot of ways, it's more important than the jump in downstream speed, especially for business applications."

Once most of the early adopters and businesses are won over by the inherent technical advantages of ADSL2+, content will probably become a major driver of ADSL2+ into the wider market. The triple-play factor, where an ISP provides broadband, telephony and video-on-demand as one package, has major appeal for Internode, as it does for other ISPs.

Hidden benefits

Hackett says: "Video services including HD-quality on-demand video become possible if the underlying ADSL2+ network has been built from day one with video — as well as Internet — in mind. The Internode national deployment is

“iiNET AND INTERNODE'S EXPERIENCE IS THAT ADSL2+ SPEED IS A BIG DRIVER BY ITSELF WITH EARLY ADOPTERS

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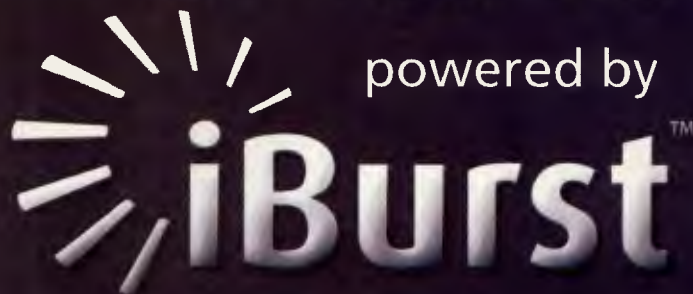


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built to do this, and it will do it in spades during 2006. It's important to appreciate that I'm not just referring to downloading streaming video on your Internet link. I'm referring to your phone line becoming a multifunction path for Internet, TV/Video on Demand and voice, all at once, all in parallel. And you'll buy the 'TV-like' parts from us on a pricing model designed for that usage — not by the megabyte. To a great extent, the end point here is not so much 24Mbit/s Internet, as it is 5-10 Mbit/s Internet, plus one or two 4Mbit/s MPEG-4 HD-quality video streams, and as many concurrent Node Phone voice-over-broadband calls as you need. All using that one little phone line that has been there all the time."

Right now, smaller ISPs are less concerned with triple-plays and more with actually having an ADSL2+ product to sell. The managing director of BIT.net, James Austin, says his ISP company is too small to roll out its own ADSL2+ DSLAMs to exchanges. So, it will look to alternative wholesalers if Telstra does not resell ADSL2+ services soon. Austin recently tried to put together a consortium of ISPs to

build their own ADSL2+ infrastructure, but it failed because members, he says, were driven by "too much self interest."

The powerline option

Geoff Hughes, manager of Country Energy's CEInternet says his ISP will wait to see how Telstra will move on the issue. However, CEInternet is also investigating alternative broadband technologies, such as broadband over power lines: "Broadband over power lines has great potential. With ADSL you still have to enable an exchange, but in a rural regional market, if you are 5km from the exchange you're lucky to get any broadband. But broadband over power lines can deliver 20Mbit/s over longer distances and you don't need an exchange".

Another smaller ISP, Aspark, on Queensland's Sunshine Coast, is investigating WiMax technology as an alternative to ADSL2+. Director Andrew Wood says: "We are looking very closely at WiMax now; there is a huge future in that. The cost of the infrastructure investment is good for the returns you get on it, and in the bush it's more cost effective.

With WiMax you can set up a tower now and cover a 20km radius.

"One of the reasons that wireless has failed to deliver so far is that technologies from different companies have different protocols, but WiMax have now set up an industry standard that will also enable users to roam between towers."

Despite the uncertainty over Telstra's broadband intentions, it seems that 2006 will be a year in which ADSL2+ availability will keep growing, if still largely in the capital cities. Big players such as Optus and Primus will weigh into the market with ADSL2+ offerings that may include the triple-play elements of telephony and content that could make ADSL2+ even more attractive to an audience beyond early adopters.

If you're in the country and live more than 5km from an exchange, ADSL2+ won't be the solution for you.



Best-value plans for superfast broadband

Availability in your exchange still largely governs whose ADSL2+ plan you select — but some plans do stand out.

BEST SUPERFAST BROADBAND PLANS METRO AREAS

Only iiNet's ADSL2+ ("broadband2") is available in selected exchanges in all Australian capital cities. Internode is available in every capital city except Perth, Hobart and Darwin. The only ADSL2+ competitors to iiNet and Internode in metro areas are smaller ISPs in Adelaide and Perth. Otherwise, superfast broadband is available in some metro and regional areas via enhanced (unrestricted) ADSL (which can reach up to 8Mbit/s) or Optus and Telstra cable. To simplify comparisons we have omitted setup costs, which will vary between technologies and on whether you already have a modem.

1. Internode – HOME-Extreme-Value plan: ADSL2+, 24/1Mbit/s, 20GB download, \$59.95/month. Easily the best value no-strings attached ADSL2+ plan available in more than one capital city. It's actually cheaper than Telstra's 1.5Mbit/s

plan. (Telstra charges \$69.95 per month for a 0.5GB download 1.5Mbit/s plan, or \$99.95 a month for a 10GB plan.) This plan is even cheaper than Internode's 1500/256 plan because ADSL2+ uses Internode's own DSLAM port infrastructure (more cost efficient at high speeds than Telstra's DSLAM ports).

2. iiNet – iibroadband2+ Light plan: ADSL2+, 24/1Mbit/s, 20GB (10GB peak, 10GB off-peak) download, \$49.95/month. This is the most universally available and relatively low-cost plan at \$49.95, but there is a major string attached: you also have to purchase iiNet's iiPhone (\$29.95/month for line rental and 18c for local calls). While this might be good overall value, you're not just getting broadband. iiNet's more expensive business plans don't require bundling with phones.

3. AdamDirect – AdamDirect Average plan: ADSL2+, 24/1Mbit/s, 40GB download, \$59.95/month. Only available in Adelaide, but a great value plan. Nothing comes close to giving you a 40GB download limit for \$59.95 a month.

4. OptusNet – Power plan: Cable, 10Mbit/s, 20GB download (40GB off-peak), \$79.95/month. For those near exchanges not enabled for ADSL2+, cable is the closest they'll get to superfast broadband. Cable speeds will vary, but 10Mbit/s is common and OptusNet and Telstra are finally offering decent download quotas of 20GBs.

Compared to ADSL2+'s upload speeds of 1Mbit/s, cable's 256Kbit/s is surprisingly stingy. OptusNet's cable plan seems far better value than Telstra's, which is priced at \$109.95/month.

ADSL2+

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When you demand top performance from your hardware you'll be delighted with the high-end *PerformaPlus* series of ADSL2+ hardware from NetComm.

The range includes the NB8W a very powerful ADSL2+ modem router designed for performance-hungry users. It includes an ADSL2+ modem, 4-port Layer 3 QoS router, 11g Wireless Access Point and a console port for advanced diagnostics.

Also, the ultra-powerful NB9W, a feature-packed all-in-one Integrated Access Device. This stylish unit includes an ADSL2+ modem*, a 4-port Layer 3 Quality of Service (QoS) Router, two FXS ports for VoIP, one FXO port for PSTN lifeline and 802.11g wireless!

It's what you can't see that sets the *PerformaPlus* series apart from other ADSL2+ hardware. The advanced Broadcom chipset inside the NB8W and NB9W is designed to deliver high-end performance and handle multiple processor-intensive Internet applications at the same time.

Demanding tasks such as VoIP, Video on Demand, High Definition Multimedia Streaming, Web serving/hosting, On-line gaming, peer-to-peer file sharing and more are a breeze for the processing power inside the NB8W and NB9W.

The *PerformaPlus* series is designed for the power-hungry broadband Internet user who does not compromise on quality and wants their computer hardware to deliver performance plus!



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* Your ISP must provide you with an ADSL2 or 2+ service for this feature to be available. This product will operate as a standard ADSL modem router when an ADSL2/2+ service is not available.

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BEST SUPERFAST BROADBAND PLANS REGIONAL AREAS

If you live in regional Australia, you'll be lucky to get ADSL2+ but fast broadband is available in some areas via enhanced ADSL and cable.

NSW

TSN Internet - MAXI 2+ plan: ADSL2+, 24/1Mbit/s, 15GB download, \$49.95/month. Available in Port Macquarie, Taree, plans for Forster/Tuncurry, Telegraph Point, Macksville, Nambucca, Kendall, Coffs Harbour, Laurieton, Kempsey and others.

VICTORIA

Neighborhood Cable - 22.5GB plan: Cable, Max/1Mbit/s, 12GB downloads, \$129.95/month. Available in Geelong, Ballarat and Mildura.

iPrimus - 2000 12000 plan: Enhanced ADSL1, 2Mbit/s/384Kbit/s (a marketing cap, in practice gets up to 6Mbit/s); 12GB download, \$49.95/month. Selected country areas.

QUEENSLAND

TSN Internet - MAXI 2+ plan: ADSL2+ 24/1Mbit/s, 15GB download, \$49.95/month. Fortitude Valley.

OntheNet - AT-F24000-C plan: ADSL2+ 24/1Mbit/s, 12GB download (+12GB off-peak), \$69/month. Available on Gold Coast.

iPrimus - 2000 12000 plan: Enhanced ADSL1, 2Mbit/s/384Kbit/s (a marketing cap, in practice gets up to 6Mbit/s); 12GB download, \$49.95/month. Selected country areas.

WESTERN AUSTRALIA

Cyberlink - Enhanced 8000 B1 plan: Enhanced ADSL1, 8/1Mbit/s, 20GB download, \$59/month. Country areas.

SOUTH AUSTRALIA

Internode - HOME-Extreme-Value plan: ADSL2+, 24/1Mbit/s, 20GB download, \$59.95/month. Selected areas.

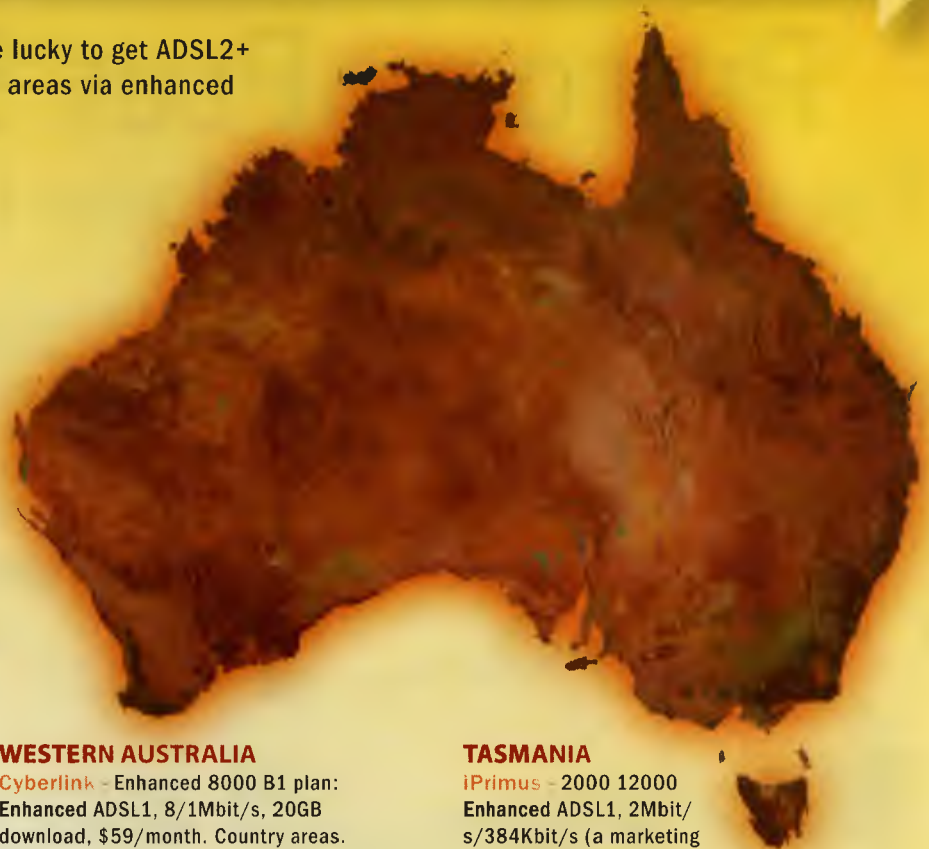
Cyberlink - Enhanced 8000 B1 plan: Enhanced ADSL1, 8/1Mbit/s, 20GB download, \$59/month. Selected country areas.

TASMANIA

iPrimus - 2000 12000 Enhanced ADSL1, 2Mbit/s/384Kbit/s (a marketing cap, in practice gets up to 6Mbit/s); 12GB download, \$49.95/month.

ACT and NORTHERN TERRITORY

See Best Metro Plans



your monthly broadband guide

APC is proud to partner with the independent broadband price monitoring service Broadband Choice (<http://broadbandchoice.com.au>) to bring you the best ADSL and cable deals.

The comparison table on the following pages focuses on Internet service providers that best serve the majority of APC readers' needs — those that have national coverage (though we have included some ISPs that provide higher than 2Mbit/s speed services in limited areas).

Only those meeting at least three of our four plan selection criteria are listed:

- Budget plan: cheapest deal under \$35/month.
- Light plan: cheapest deal under \$65/month, with at least 512Kbit/s speed and 1GB data.

- Family plan: largest download allowance under \$80/month, at least 512Kbit/s and 10GB data.
- High speed: cheapest 1.5Mbit/s plan under \$100/month, with 10GB data minimum.

If an ISP has "unlimited downloads" but speed is throttled after reaching a certain limit, the portion in which you can get full-speed downloads is listed as its limit.

APC has picked the lowest price for a contract period of six months or less for broadband installation. Otherwise, the lowest priced option was selected.

The installation price doesn't include a modem because you may get better value by buying one separately. Turn to the Best Buys

section for our recommendation of the best broadband modem/router currently available.

Can't find your provider in our list? That's because some of the largest ISPs, and many smaller ones, didn't meet the selection criteria. There may be ISPs we didn't list that will provide better deals but only service your local area or state. ISPs enter their own information into the Broadband Choice database. ISPs can contact bc@whirlpool.net.au for more details. Data for our table was extracted from the Broadband Choice database on 11 December 2005.



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Your **Broadband** Phone Service

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start from 2¢/min.**

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Untimed!*
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anytime, anywhere**

*MegaServer Plan only.



VMNF300 Adaptor with 1 VoIP port and landline connection

- Make and receive calls to or from VoIP port or landline
- Use a normal telephone set for both services
- Use the landline service for lifeline emergencies
- Includes Quality of Service (QoS) functions for optimum voice quality
- Integrated firewall, router and 3 port switch

MNF211R / VMNF300
\$199.00
incl. \$5.00 call credit

V100LS

Telephone Adaptor - 1 VoIP port

- Make and receive VoIP calls to/from anywhere
- Use normal or DECT wireless telephone handset
- Simple to set up / plug and play



MNF201 / V100LS

\$129.00

incl. \$5.00 call credit

TA612V

Telephone Adaptor - 2 VoIP ports

- Make and receive VoIP calls to/from anywhere
- Use normal or DECT wireless telephone handset
- Include Quality of Service (QoS) functions for optimum voice quality



MNF202R / TA612V

\$149.00

incl. \$10.00 call credit

VMNF85

IP Telephone Handset

- Make and receive VoIP calls to/from anywhere
- Plug straight into broadband connection
- Ideal for small or home offices



MNF85 / VMNF85

\$185.00

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- Take it anywhere with you
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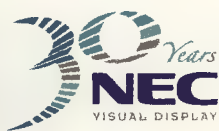
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Name	Phone	Online	Budget plan (under \$35)	Light plan (under \$60, at least 512Kbit/s, minimum 1GB data limit)	Family plan (under \$80, at least 512Kbit/s, minimum 10GB data limit)	High-speed plan (under \$100, at least 1.5Mbit/s, minimum 10GB data limit)	National	Emails	Spam filtering	Setup fee & contract length	Rapid transfer
Superfast broadband ISPs (faster than 1.5Mbit/s)											
libroadband2 ADSL (12Mbit/s)	13 19 17	www.libnet.net.au	\$29.95* 500MB 12Mbit/s	\$39.95* 2GB+ 12Mbit/s	\$69.95* 20GB+ 12Mbit/s	\$49.95* 10GB+ 12Mbit/s	✗	10	✓	\$119 6mths	✗
Internode Extreme ADSL2+	13 66 33	www.internode.on.net	N/A	\$59.95 15GB 24Mbit/s	\$79.95 30GB 24Mbit/s	\$59.95 15GB 24Mbit/s	✗	5	✓	\$129 6mths	✗
iPrimus 2000K+	1300 854 848	www.iprimus.com.au	\$29.95* 400MB 2Mbit/s	\$49.95 12GB 2Mbit/s	\$49.95 12GB 2Mbit/s	\$49.95 12GB 2Mbit/s	✗	5	\$2	\$99 12mths	✗
OptusNet Cable	1800 504 504	http://broadbandsales. optusnet.com.au	\$29.95* 300MB+ 10Mbit/s	\$39.95* 2GB+ 10Mbit/s	\$69.95* 20GB+ 10Mbit/s	\$69.95* 20GB+ 10Mbit/s	✗	5	✓	\$39 12mths	✗
OzEmail broadband2 12Mbit	13 35 93	http://homesite.service. ozemail.com.au	\$29.95* 500MB 12Mbit/s	\$39.95* 2GB+ 12Mbit/s	\$69.95* 20GB+ 12Mbit/s	\$49.95* 10GB+ 12Mbit/s	✗	10	✓	\$119 6mths	✗
Primus-AOL 2000K+	1800 265 777	www.primusonline.com.au	\$29.95* 400MB 2Mbit/s	\$49.95 12GB 2Mbit/s	\$49.95 12GB 2Mbit/s	\$49.95 12GB 2Mbit/s	✗	7	✗	\$149 3mths	✗
Telstra BigPond Cable	13 12 82	www.bigpond.com	\$29.95* 200MB^ 10Mbit/s	N/A	\$69.95 10GB^ 10Mbit/s	\$69.95 10GB^ 10Mbit/s	✗	1	\$3	\$189 3mths	✗

Regular broadband ISPs (1.5Mbit/s or less)

AAPT smartchat	13 88 88	www.aapt.com.au	\$29* 500MB 256Kbit/s	\$39* 12GB 512Kbit/s	\$59* 15GB 1.5Mbit/s	\$59* 15GB 1.5Mbit/s	✓	6	✓	\$0 1mth	✗
Aardvark Internet	1800 227 382	www.aardvark.net.au	\$29.95* 200MB 256Kbit/s	\$45* 1.5GB 512Kbit/s	\$78.50 30GB 512Kbit/s	\$84.50 10GB 1.5Mbit/s	✓	5	✓	\$130 6mths	✓
Alphalink	1300 360 638	http://home.alphalink. com.au	\$29.70* 200MB 256Kbit/s	\$44.90 1GB 512Kbit/s	\$69.90 10GB 512Kbit/s	\$99.90 10GB 1.5Mbit/s	✓	5	✓	\$121 1mth	✓
Aspark ADSL	1300 662 300	www.aspark.com.au	\$25* 15GB 256Kbit/s	\$35* 25GB 512Kbit/s	\$79.95 No limit 512Kbit/s	\$74.95 35GB 1.5Mbit/s	✓	100	✓	\$99 1mth	✓
AuNix Broadband	1300 765 742	www.aunix.com.au	\$29.95* 5GB 256Kbit/s	\$34.95* 15GB 512Kbit/s	\$66.95* 25GB 1.5Mbit/s	\$66.95* 25GB 1.5Mbit/s	✓	5	✓	\$99 1mth	✓
AussieWide Internet	1300 556 491	www.aussiewide.com	N/A	\$59.95 30GB 512Kbit/s	\$59.95 30GB 512Kbit/s	\$99 30GB 1.5Mbit/s	✓	4	✓	\$132 6mths	✓
Australis Internet	1300 722 050	www.australis.net	\$29.95* 400MB 256Kbit/s	\$44.95 25GB 512Kbit/s	\$70.95 35GB 1.5Mbit/s	\$70.95 35GB 1.5Mbit/s	✓	25	✓	\$149 1mth	✓
Aztec ISP Home broadband	1300 768 513	www.aztec.aunz.com	N/A	\$39.95 25GB 512Kbit/s	\$69.95 35GB 1.5Mbit/s	\$69.95 35GB 1.5Mbit/s	✓	5	✓	\$99 12mths	✓
BIT.net	1300 248 638	www.bit.net.au	\$31.95 2GB 256Kbit/s	\$41.95 2GB 512Kbit/s	\$69.95 No limit 512Kbit/s	\$89.95 25GB 1.5Mbit/s	✓	5	✓	\$99 6mths	✓
BKB Internet Residential ADSL	1800 252 638	www.bkb.net.au	N/A	\$49.95 1GB 512Kbit/s	\$69.95 10GB 512Kbit/s	\$99.95 10GB 1.5Mbit/s	✓	1	✓	\$139 6mths	✓
Brown Bear ADSL / VOIP	1300 730 720	www.brownbear.net.au	N/A	\$47* 10GB 512Kbit/s	\$54* 30GB 512Kbit/s	\$87* 10GB 1.5Mbit/s	✓	100	✓	\$119 6mths	✓
CEInternet Broadband	1800 222 256	www.ceinternet.com.au	\$29.95* 200MB 256Kbit/s	N/A	\$79.95 10GB 512Kbit/s	\$99.95 10GB 1.5Mbit/s	✓	5	\$2.50	\$99 1mth	✓
Cheetah by Ozieweb	1300 727 374	www.cheetah.net.au	\$29.95* 200MB 256Kbit/s	N/A	\$69.95 15GB 512Kbit/s	\$99.95 15GB 1.5Mbit/s	✓	5	✓	\$129 6mths	✓
Comcen Internet	1300 300 324	www.comcen.com.au	\$19.95* 200MB 256Kbit/s	\$39.95* 1GB+ 512Kbit/s	\$79.99 No limit 512Kbit/s	\$69.95* 15GB+ 1.5Mbit/s	✓	5	✓	\$99 6mths	✓
ComeOnAussie Home ADSL	1300 361 317	www.comeonaussie.net	\$34.95 15GB 256Kbit/s	\$39.95 25GB 512Kbit/s	\$69.95 35GB 1.5Mbit/s	\$69.95 35GB 1.5Mbit/s	✓	50	✓	\$129 12mths	✓
ComeOnAussie Business ADSL	1300 361 317	www.comeonaussie.net	N/A	\$59.95* 25GB 512Kbit/s	\$59.95* 25GB 512Kbit/s	\$84.95* 35GB 1.5Mbit/s	✓	10	✓	\$129 12mths	✓
Concept Networks Stamina	1300 132 331	www.conceptual.net.au	\$29.95* 250MB 256Kbit/s	\$59.95* 1GB 512Kbit/s	\$69.95 No limit 512Kbit/s	N/A	✓	5	✓	\$99 6mths	✓
Curl DSL	1300 135 908	http://curl.com.au	\$29.95* 15GB 256Kbit/s	\$34.95* 25GB 512Kbit/s	\$59.95* 35GB 1.5Mbit/s	\$59.95* 35GB 1.5Mbit/s	✓	15	✓	\$139 1mth	✓
Cybernet ADSL	1300 133 599	www.cybernetinternet.com	\$19* 200MB 256Kbit/s	\$49.95 25GB 512Kbit/s	\$79.95 35GB 1.5Mbit/s	\$79.95 35GB 1.5Mbit/s	✓	5	✓	\$49 6mths	✓
CyberOne ADSL	1300 720 062	www.cyberone.com.au	\$15.95* 200MB 256Kbit/s	\$54.95 No limit 512Kbit/s	\$54.95 No limit 512Kbit/s	\$84.95 No limit 1.5Mbit/s	✓	30	✓	\$0 1mth	✓
D2 ADSL	1300 131 368	www.d2.net.au	\$29.95* 200MB 256Kbit/s	N/A	\$74.95 10GB 512Kbit/s	\$99.95 10GB 1.5Mbit/s	✓	10	✗	\$119.95 6mths	✓
DCSI	1300 665 575	www.dcsi.net.au	\$29.95 500MB 256Kbit/s	\$49.95 10GB 512Kbit/s	\$59.95 20GB 512Kbit/s	\$79.95 20GB 1.5Mbit/s	✓	6	✓	\$125 6mths	✓
DigiPlus	13 34 41	www.digiplus.com.au	\$24.95* 300MB 256Kbit/s	N/A	\$74.95 10GB 512Kbit/s	\$99.95 10GB 1.5Mbit/s	✓	5	✗	\$129 1mth	✓
Dodo	13 16 02	www.dodo.com.au	\$24.90* 250MB^ 256Kbit/s	\$39.90* 1GB^ 512Kbit/s	\$59.90 30GB^ 1.5Mbit/s	\$59.90 30GB^ 1.5Mbit/s	✓	30	\$1.90	\$119 1mth	✓
DragNet Budget ADSL	1800 069 050	www.dragnet.com.au	\$26.95* 200MB^ 256Kbit/s	N/A	\$69.95 10GB^ 512Kbit/s	\$95.95 10GB^ 1.5Mbit/s	✓	1	✓	\$100 6mths	✓
E-SOUL	1300 367 258	www.esoul.net.com.au	N/A	\$52.95 25GB 512Kbit/s	\$52.95 25GB 512Kbit/s	\$89.95 35GB 1.5Mbit/s	✓	5	✓	\$129 6mths	✓
Empcom ADSL Service	1300 731 368	www.empcom.net	\$25 1GB 256Kbit/s	\$35 1GB 512Kbit/s	\$65 No limit 512Kbit/s	\$75 10GB 1.5Mbit/s	✓	5	✓	\$129 6mths	✓
FutureWeb Pty Ltd	1300 361 355	www.futureweb.com.au	\$31.95* 200MB 256Kbit/s	\$49.95 1.5GB 512Kbit/s	\$73.95 15GB 512Kbit/s	N/A	✓	2	✓	\$120 6mths	✓
Gday.net ADSL Broadband	1300 668 640	http://telecom.gday.net	\$24.95* 300MB^ 256Kbit/s	N/A	\$69.95 10GB^ 512Kbit/s	\$99.95 10GB 1.5Mbit/s	✓	5	✗	\$129 1mth	✓
Global Dial ZapDSL	1300 130 710	www.globaldial.com	\$29.95* 300MB 256Kbit/s	\$49.95 2GB+ 512Kbit/s	\$79.95 No limit 512Kbit/s	\$89.95 14GB+ 1.5Mbit/s	✓	10	✓	\$99 6mths	✓
Glocomm Broadband ADSL	1300 728 392	www.glocomm.net.au	\$28.95* 500MB 256Kbit/s	\$42.95* 3GB 512Kbit/s	\$68.95 35GB 1.5Mbit/s	\$68.95 35GB 1.5Mbit/s	✓	5	✓	\$179 1mth	✓
Goldlink ADSL	1300 654 024	www.goldlink.com.au	\$29.95 500MB 256Kbit/s	\$49.95 25GB 512Kbit/s	\$69.95 35GB 1.5Mbit/s	\$69.95 35GB 1.5Mbit/s	✓	10	✓	\$99 6mths	✓
Hande Communications xDSL	1300 306 131	www.hande.com.au	\$29.95 1GB 256Kbit/s	\$39.95 5GB 512Kbit/s	\$64.95 15GB 1.5Mbit/s	\$64.95 15GB 1.5Mbit/s	✓	5	✓	\$119.95 1mth	✓
Hylinx ADSL	1300 132 014	www.hylinx.com	N/A	\$39.95 25GB 512Kbit/s	\$69.95 35GB 1.5Mbit/s	\$69.95 35GB 1.5Mbit/s	✓	5	✓	\$129 6mths	✓

Name	Phone	Online	Budget plan (under \$35)	Light plan (under \$60, at least 512Kbit/s, minimum 1GB data limit)	Family plan (under \$80, at least 512Kbit/s, minimum 10GB data limit)	High-speed plan (under \$100, at least 1.5Mbit/s, minimum 10GB data limit)	National	Emails	Spam filtering	Setup fee & contract length	Rapid transfer
Regular broadband ISPs (1.5Mbit/s or less) continued											
Infinity Plus Residential DSL	1300 726 340	www.infinityplus.net.au	N/A	\$49.95† 25GB 512Kbit/s	\$79.95† 30GB 1.5Mbit/s	\$79.95† 30GB 1.5Mbit/s	✓	5	✓	\$100 6mths	✓
Instant Communications ADSL	1300 139 369	www.in.com.au	N/A	\$59.95 No limit 512Kbit/s	\$59.95 No limit 512Kbit/s	\$99.95 50GB 1.5Mbit/s	✓	5	✓	\$99 6mths	✓
Internode Home ADSL	13 66 33	www.internode.on.net	\$29.95 500MB 256Kbit/s	\$39.95 2GB 512Kbit/s	\$69.95 30GB 512Kbit/s	\$69.95 15GB 1.5Mbit/s	✓	5	✓	\$129 6mths	✓
iPrimus Standard	1300 854 848	www.iprimus.com.au	\$19.95* 200MB 256Kbit/s	\$39.95 1GB 512Kbit/s	\$59.95 12GB 512Kbit/s	\$89.95 12GB 1.5Mbit/s	✓	5	\$2	\$99 12mths	✗
iSage Internet ADSL	1300 725 789	www.isage.aunz.net	\$29.95† 15GB 256Kbit/s	\$34.95† 25GB 512Kbit/s	\$64.95† 35GB 1.5Mbit/s	\$64.95† 35GB 1.5Mbit/s	✓	5	✓	\$99 1mth	✓
Jumba Broadband	1300 855 554	www.jumba.com.au	N/A	\$45.95 15GB+ 512Kbit/s	\$55.95 30GB+ 512Kbit/s	\$69.95 15GB+ 1.5Mbit/s	✓	5	✓	\$139 6mths	✓
Lets Go ADSL	1300 556 114	www.letsgo.com.au	N/A	\$59.95 30GB 512Kbit/s	\$59.95 30GB 512Kbit/s	\$99.95 30GB 1.5Mbit/s	✓	2	✓	\$99 6mths	✓
Matilda Internet DSL	1300 665 865	www.matilda.net.au	\$29.95* 200MB 256Kbit/s	\$49.95* 1GB 512Kbit/s	\$59.95 10GB 512Kbit/s	\$89.95 10GB 1.5Mbit/s	✓	5	✓	\$110 1mth	✓
Midcoast Internet	1300 134 638	www.midcoast.com.au	\$28.50* 200MB^ 256Kbit/s	N/A	\$71.50* 10GB^ 512Kbit/s	\$98* 10GB^ 1.5Mbit/s	✓	5	✓	\$130 6mths	✓
Mydoor.com.au ADSL	1300 736 783	www.mydoor.com.au	\$34.95 500MB 256Kbit/s	\$44.95 1.5GB 512Kbit/s	\$79.95 30GB 512Kbit/s	\$89.95 15GB 1.5Mbit/s	✓	3	✓	\$110 6mths	✓
NCD ADSL	1300 768 433	www.ncd.net.au	\$29.95* 1GB 256Kbit/s	\$39.95* 2GB 512Kbit/s	\$74.95 35GB 1.5Mbit/s	\$69.95* 15GB 1.5Mbit/s	✓	10	✗	\$125 6mths	✓
Netbay Xtreme DSL	1300 733 215	www.netbay.com.au	\$24.95* 200MB 256Kbit/s	\$49.95* 4GB 512Kbit/s	\$69.95 No limit 512Kbit/s	\$99.95* 15GB 1.5Mbit/s	✓	5	✓	\$120 6mths	✓
Netspace Home ADSL	13 14 56	www.netspace.net.au	\$29.95* 300MB 256Kbit/s	\$49.95 5GB+ 512Kbit/s	\$69.95 25GB+ 512Kbit/s	\$79.95 20GB+ 1.5Mbit/s	✓	10	✓	\$109 6mths	✓
Optraweb ADSL/VOIP	1300 730 720	www.optraweb.com.au	N/A	\$48† 10GB 512Kbit/s	\$55† 30GB 512Kbit/s	\$88† 10GB 1.5Mbit/s	✓	100	✓	\$119 6mths	✓
OzForces Residential ADSL	1300 134 081	www.ozforces.com	\$24.95* 200MB 256Kbit/s	N/A	\$68.95 No limit 512Kbit/s	\$89.95 No limit 1.5Mbit/s	✓	5	✓	\$119 6mths	✓
Ozziehost ADSL	1300 769 615	www.ozziehost.net.au	\$29.95* 200MB 256Kbit/s	\$59.95* 2GB 512Kbit/s	\$79.95* 20GB 512Kbit/s	N/A	✓	5	✓	\$120 6mths	✓
Pacific Internet DSL	13 36 35	www.pacific.net.au	\$29.95* 250MB 256Kbit/s	\$39.95 1GB 512Kbit/s	\$54.95 No limit 512Kbit/s	N/A	✓	5	✓	\$99 6mths	✓
Primus-AOL Standard	1800 265 777	www.primusonline.com.au	\$24.95* 300MB 256Kbit/s	\$49.95 2GB 512Kbit/s	\$69.95 12GB 512Kbit/s	N/A	✓	7	✗	\$149 3mths	✗
Qualmark Online	1300 138 558	www.qualmarkonline.com.au	N/A	\$53.50 5GB 512Kbit/s	\$69.95 15GB 512Kbit/s	\$89.95 10GB 1.5Mbit/s	✓	5	✗	\$129 6mths	✓
Rabbit Internet ADSL	1800 501 106	http://rabbit.com.au	\$16.50†* 200MB 256Kbit/s	\$35.15†* 1GB 512Kbit/s	\$51.38† No limit 512Kbit/s	\$71.41†* 10GB 1.5Mbit/s	✓	5	✓	\$99 6mths	✓
Rapid Net ADSL	1300 724 677	www.rapidnet.com.au	\$29.95* 200MB 256Kbit/s	\$49.95 25GB 512Kbit/s	\$79.95 35GB 512Kbit/s	\$79.95 35GB 1.5Mbit/s	✓	3	✓	\$119 12mths	✓
REEDS.NET Internet Services	1300 798 801	www.reeds.net.au	N/A	\$44.95 25GB 512Kbit/s	\$79.95 35GB 1.5Mbit/s	\$79.95 35GB 1.5Mbit/s	✓	5	✓	\$145 6mths	✓
Reset Residential xDSL	1300 662 670	www.reset.net.au	\$29.95* 500MB 256Kbit/s	\$49.95 25GB 512Kbit/s	\$49.95 25GB 512Kbit/s	\$89.95 35GB 1.5Mbit/s	✓	5	✓	\$99 12mths	✓
Schaelec Residential Grade DSL	1300 554 687	www.Schaelec.com.au	\$29.95* 5GB 256Kbit/s	\$38.95 25GB 512Kbit/s	\$64.95 35GB 1.5Mbit/s	\$64.95 35GB 1.5Mbit/s	✓	5	✓	\$139 6mths	✓
Schaelec Business Grade DSL	1300 554 687	www.Schaelec.com.au	N/A	\$59.95* 25GB 512Kbit/s	\$59.95* 25GB 512Kbit/s	\$84.95* 35GB 1.5Mbit/s	✓	5	✓	\$139 6mths	✓
Southern Phone National ADSL	13 14 64	http://southernphone.com.au	\$34.95† 15GB 256Kbit/s	\$44.95† 25GB 512Kbit/s	\$44.95† 25GB 512Kbit/s	\$89.95† 35GB 1.5Mbit/s	✓	5	✓	\$99 12mths	✓
Spin Internet	1300 303 375	www.spin.net.au	\$19.99* 200MB 256Kbit/s	\$39.99* 1GB+ 512Kbit/s	\$79.99 No limit 512Kbit/s	\$69.99* 15GB+ 1.5Mbit/s	✓	5	✓	\$99 6mths	✓
ST ADSL Internet	1300 138 177	www.sttelecom.com.au	\$29.70* 200MB 256Kbit/s	N/A	\$68.96 10GB 512Kbit/s	\$99.99 10GB 1.5Mbit/s	✓	3	✗	\$99 6mths	✓
TeeGee Internet ADSL	1300 731 132	www.teege.com.au	\$28.95* 3GB 256Kbit/s	\$34.95* 10GB 512Kbit/s	\$64.95* 20GB 1.5Mbit/s	\$64.95* 20GB 1.5Mbit/s	✓	5	✓	\$99 1mth	✓
telaustalia SME & Res	1300 783 528	http://telaustalia.com.au	N/A	\$49.95 25GB 512Kbit/s	\$79.95 35GB 1.5Mbit/s	\$79.95 35GB 1.5Mbit/s	✓	5	✗	\$120 6mths	✓
TSN Broadband	13 14 86	http://inweb.tsn.cc	\$29.95† 1GB 256Kbit/s	\$49.95† 13GB 512Kbit/s	\$68.95† No limit 512Kbit/s	\$99.95† 24GB 1.5Mbit/s	✓	100	✓	\$129 6mths	✓
Velocity Internet ADSL	1300 557 300	www.velocitynet.com.au	\$29.95* 300MB 256Kbit/s	\$49.50* 4GB 512Kbit/s	\$79.50* 50GB 512Kbit/s	\$89.50* 24GB 1.5Mbit/s	✓	10	✓	\$69 6mths	✓
VIP ADSL	1300 851 536	www.viponline.net.au	N/A	\$52 2GB 512Kbit/s	\$75 20GB 512Kbit/s	\$94 10GB 1.5Mbit/s	✓	5	✓	\$0 6mths	✓
VitalTel ADSL Broadband	1300 858 706	www.vitaltel.com.au	\$24.95* 200MB 256Kbit/s	\$59.95 10GB 512Kbit/s	\$59.95 10GB 512Kbit/s	\$79.95 10GB 1.5Mbit/s	✓	5	✓	\$139.95 1mth	✓
Web Ace ADSL	1800 202 012	www.webace.com.au	\$28.95* 250MB 256Kbit/s	\$39.95† 1GB 512Kbit/s	\$56.95† 30GB 512Kbit/s	\$92.95† 20GB 1.5Mbit/s	✓	20	✓	\$119 6mths	✓
Webzone	1300 303 932	www.webzone.net.au	\$32.95 1GB 256Kbit/s	N/A	\$79.95 30GB 512Kbit/s	\$99.95 10GB 1.5Mbit/s	✓	4	✓	\$149 6mths	✓
WA Budget ADSL	1300 365 678	www.westnet.net.au	\$29.95 500MB 256Kbit/s	\$39.95 1GB 512Kbit/s	\$79.95 No limit 512Kbit/s	\$69.95 10GB+ 1.5Mbit/s	✓	6	\$4.16	\$99 12mths	✓
Westnet Home ADSL	13 19 60	http://westnet.com.au	\$19.95* 200MB 256Kbit/s	\$39.95 1GB 512Kbit/s	\$79.95 30GB+ 512Kbit/s	\$69.95 10GB+ 1.5Mbit/s	✓	6	\$1	\$99 6mths	✓
Wild Internet ADSL + Phone	1800 809 453	www.wildsl.com.au	\$31.95† 15GB 256Kbit/s	\$39.95† 25GB 512Kbit/s	\$59.95† No limit 512Kbit/s	\$69.95† 35GB 1.5Mbit/s	✓	1000	✓	\$49 6mths	✓
Wild IT Budget DSL + Phone	1800 809 453	www.wildsl.com.au	\$28.95†* 5GB 256Kbit/s	\$34.95†* 10GB 512Kbit/s	\$64.95†* 20GB 1.5Mbit/s	\$64.95†* 20GB 1.5Mbit/s	✓	5	✓	\$99 1mth	✓
Yaussie Net ADSL	1300 883 352	www.yaussie.com.au	\$29.95* 8GB 256Kbit/s	\$37.95* 25GB 512Kbit/s	\$65.95* 35GB 1.5Mbit/s	\$63.95* 14GB 1.5Mbit/s	✓	5	✓	\$110 6mths	✓
ZCTS ADSL	1300 852 949	www.zcts.net	N/A	\$44 25GB 512Kbit/s	\$78.50 35GB 1.5Mbit/s	\$78.50 35GB 1.5Mbit/s	✓	20	✓	\$49 1mth	✓

Key: * ISP charges excess usage fees when you exceed your download limit; † This price only available if bundled with long distance telephony from the ISP.
+ Additional download allowance available with this plan for use in off-peak periods; ^ ISP combines sent and received data when calculating usage



Beyond Blue

The future of DVD won't be decided by the best technology. Instead, as *Simon Sharwood* explains, the weird politics that exist between Hollywood and the computer industry will determine what ends up spinning around inside our PCs.

Napster and Kazaa have a lot to answer for. Hollywood watched with wide-eyed terror as the pair shredded the music industry's business model and revenue base. In their LA eyries, movie executives quietly resolved to never allow a similar threat to their livelihoods.

Increasingly, that livelihood means DVDs. Pixar's *Finding Nemo* sold more than 20 million copies in North America alone. Each *Lord of the Rings* movie sold a few million copies in its first week of release — at more than \$20 apiece. The drip-drop of old titles onto the DVD market also testifies to the dollars to be made regurgitating old movies for new audiences or baby-boomers keen to update their libraries.

Hollywood is not interested in shedding a single dollar of that revenue. And that means making sure that DVD continues to deliver a better experience than any potential online rival — so they can cling to the dollar stream that comes from selling us discs.

The movie industry also realises our love affair with the DVD has to be supported

with even better picture quality, so that the familiar and much-loved 12cm disc can support the emerging HDTV standard. And of course, Hollywood is eager to feed our appetites for out-takes and commentaries (and would prefer not to trouble us to get up off the couch to put a new disc in the player).

But, Hollywood's requirements don't stop there. The movie industry realises that in the near future all sorts of devices will become connected to the Net or a home network that sends movies to multiple devices, so it wants whatever format it adopts to be all but copy-proof (so that even if a new Napster arrives, the format's IP is safely locked away). It also wants the discs to be cheap to manufacture, and to pay as few royalties as possible for the right to produce them.

Hollywood also prefers a single format to dominate: explaining warehouses full of unsold Beta movies in the 1980s was no fun, and no-one wants to dust off the old excuses.

The computer industry has a wish-list too. It wants large-capacity discs so that it can satisfy consumers' demands for

ever-increasing storage. Digital rights management is another must-have.

Hollywood is terrified of broadband's potential to Napster-ise movies and has enthusiastically embraced initiatives, like Intel's DRM-on-a-chip, that make it harder to distribute pirated films. The computer industry wants to play ball to ensure it gets its share of the fun and has the chance to take on consumer electronics companies whose devices have never threatened piracy.

Computer types get quite insistent when discussions turn to relatively arcane matters like access time and file systems — as these impact on the experience people have using a device in a PC. They also want any new DVD tech to be user-friendly right off the bat, lest anyone be forced to repeat the future equivalent of the horror that was running MYST on a single-speed CD-ROM drive.

Last but not least, a small number of computer companies want discs to feature their software — to increase their influence over the digital entertainment ecosystem (and to snare a few royalty bucks as well).



“HOLLYWOOD PREFERS A SINGLE FORMAT: EXPLAINING WAREHOUSES FULL OF UNSOLD BETA MOVIES IN THE 1980s WAS NO FUN

LET'S HAVE A CRACK AT IT

These hefty lists of requirements were framed by individual companies, and then shared in forums where future disc technology was discussed. The near-inevitable result was disagreements of one sort or another, which meant more than one contender decided it would have a crack at creating the next generation of DVDs.

A few have already gone by the wayside. Versatile Multilayer Disc (VMD) promised capacities of 20-40GB per disc and was sponsored by Chinese manufacturers, but attracted little attention elsewhere.

Enhanced Versatile Disc (EVD) made a run for the title but seems to have fallen well short after alliance partners bailed on each other in 2004. Forward Versatile Disc was announced in 2004 and promptly disappeared.

However, these ideas were proposed by small companies (with little chance of welding together a coalition of entertainment and computing companies to usher a new standard into the marketplace). Both VMD and EVD formats are therefore more likely to make appearances in trivia questions than they are to land in your PC anytime soon.

The field has therefore settled down to two contenders: one is Sony's Blu-ray; the other is Toshiba's HD-DVD.

Both increase the amount of data that can be packed onto a disc, a trick enabled by the use of blue lasers. The red lasers present in current CD and DVD drives use a beam of light 650 nanometres wide. Blue lasers reduce that to 405 nanometres; the smaller beam allows a blue laser to read physically smaller variations on a disc and turn those into information.

But while both are committed to blue lasers, each has a different approach to other

THE FUTURE IS HOLOGRAPHIC

While the battle rages over the future of DVD, a group of companies are already proposing a new standard — Holographic Versatile Disc (HVD) — and believe they can cram 3.9 terabytes (yes, terabytes!) onto a single disc (and offer transfer speeds of 1GB/s).

The key to this breakthrough is a new laser technique, called Collinear Holography, that uses two lasers instead of one to read data stored in a holographic medium (that allows greater density than current optical techniques). The technology was developed by Japanese company Optware,

which has formed an HVD Alliance that boasts 12 members including LITE-ON and Konica Minolta.

The Alliance says it will have products ready in mid-2006, and will initially target the broadcasting industry, film-makers and government users.



key issues that are fuelling intense debate around the world (and fragmenting the computing and entertainment industries into warring camps — just as VHS and Beta did two decades ago).

FEELING BLUE?

So which will win? The format with the most momentum in the market today is Blu-ray, but that lead is largely attributable to one device: Sony's PlayStation 3. Sony will use Blu-ray players and discs in the forthcoming console and, with shipments expected to hit tens of millions of units, this will give the format a mighty head start in the market.

PlayStation 3 will most likely use the read-only BD-ROM format. But Blu-ray will also offer BD-R and BD-RE formats that allow write-once and write-many functionality. Disc capacity will be up to 27GB for a single layer disk and 54GB for double-

layer platters. Read/Write will initially be at 36Mbps/s, but the team behind Blu-ray already has plans to reach 8x speeds of 288Mbps/s in the future.

A host of video codecs will be supported by the standard, with MPEG-4 AVC High Profile and Microsoft's VC-1 mandatory. MPEG-2 support should also be available. Audio codecs are a work in progress, but lossless codecs should be supported.

Blu-ray will also support not one but three digital rights management standards. One is the Advanced Access Content System (AACS), a DRM regime that sees a public key cryptography scheme implemented among licensed disc replicators and manufacturers of HD-DVD players.

AACS should make it possible to ensure that only discs created by a licensed replicator will play on most DVD players. This makes it a favourite for many Hollywood

studios, and has also won it the backing of Intel and Microsoft. The other standards Blu-ray supports are ROM MARK and BD+. The former tackles mass piracy with a unique identifier system while BD+ adds extra layers of encryption to AACS keys.

Blu-ray is backed by a consortium of more than 70 companies including Sony, Dell and HP. However, this Blu-ray Disk Association, as the group is known, has had nothing to do with previous generations of optical storage standards.

HD-DVD

Rather, that distinction belongs to the DVD Forum, the group behind HD-DVD.

At 30GB, HD-DVD offers less capacity than Blu-ray but supports double-sided discs to increase capacity. There's also a specification for an 8cm disc, which seems likely to find its way into portable devices.



Heavy duty or half done? HD-DVD might be ready to ship (and have the backing of the DVD Forum), but with lesser support from key industry players, it's already looking like the underdog in the upcoming battle for the consumer

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THE STATE OF PLAY

Support	Blu-ray	HD-DVD
Board members and other key supporters	Apple, Dell, Disney, Fox, HP, LG, Sony, Panasonic, Pioneer, Philips, Samsung, Sharp, Thomson, EA and 130 others.	Toshiba, NEC, SANYO, Intel, and Microsoft.
Major movie studios	Sony Pictures, MGM, Disney, Fox, Warner Bros., Paramount.	Universal Studios, Warner Bros., Paramount.
PCs	Dell and HP, commanding 58% of the US market, are likely to ship Blu-ray drives in 2006.	Toshiba, with 2% of the US market, is likely to ship HD-DVD drives in desktops and laptops by 2006.
Game consoles	Sony will offer Blu-ray in its PlayStation 3.	No announced support yet.
Technology		
Capacity	50GB initially; 100GB eventually.	15GB initially; 60GB eventually.
Programming language	Java.	Microsoft's iHD.
Copy protection	AACS, ROM MARK, BD+.	AACS.

Source: Forrester Research

The format also adds confirmed support for all things Dolby to the same video codecs as Blu-ray. HD-DVD also supports AACS and has a feature called "mandatory managed copy" that allows copies of movies to be made onto PCs for distribution over home networks.

HD-DVD is also a manufacturer's favourite, as it uses the same layering and disc construction techniques found in today's DVDs. Blu-ray, by contrast, uses a new technique that sees the first layer of storage medium buried under just 0.1mm of protective plastic. This leaves more space for extra layers (but means factories geared to produce lasers for the more familiar arrangements founding HD-DVD will need to be re-tooled). Those changes are said to be so comprehensive that the cost of making Blu-ray DVD players will be prohibitive.

There is also doubt over whether or not it will be possible to make slim Blu-ray drives,



SONY LEARNED FROM ITS BETAMAX LOSS THAT THE FORMAT WITH THE MOST INDUSTRY SUPPORT WILL WIN

an issue that leads to concerns of whether the standard will ever be viable in laptops and other portable devices.

SOFTWARE DIFFERENCES

There are also important differences in the software each format proposes to use. Microsoft and Disney have combined on an XML-based specification called iHD that the software company says allows for "enhanced content, navigation and value-added functionality for high-definition films. For example, HD-DVDs can offer advanced picture-in-picture capability so that other video,

such as a director's commentary, could play on top of the movie."

Blu-ray proposes to use Java for its interactive elements, but features like this screen-in-screen trick are only optional in the Blu-ray Disc Java specification. Blu-ray is also dogged by maturity questions. HD-DVD is all but ready to ship, but doubts persist over whether Blu-ray's claimed storage densities are production-ready or still theoretical.

OPPOSING CAMPS PREPARE FOR BATTLE

While these arguments swirl around, both camps have been busily signing up partners

FIVE STORAGE TECHS THAT FLOPPED

Name	Source	What it offered	Why it crashed and burned
Microdrive	Sinclair	Matchbox-sized tape cartridges storing a distinctly non-whopping 85KB!	Microdrive cartridges were so small and the tape so thin that they broke with terrifying frequency during everyday operations. No other manufacturer bothered to use the technology, so when Sinclair went under, so did the Microdrive.
3in floppies	Amstrad	Same rigid case as a 3.5in drive, but no support.	Amstrad bought Sinclair and hoped to move into business PCs. It failed and the 3in floppy it championed sank without trace.
2.8MB floppies	IBM	2.8MB on a 3.5in floppy.	Remember the 3.5in floppy? Remember how 1.4MB used to be quite a lot? In the mid '90s IBM thought it would be a great idea to double that capacity. The drives made it into a few IBM PCs but no-one else cared. Goodbye 2.8MB floppy!
Castlewood Orb	Castlewood	2.2GB removable disk.	It was 1997 and Iomega's Zip was selling like hot cakes. Former Seagate executives decided they would get into the removable storage caper too... and failed to make an impression with this product that offered a rigid platter but attracted little attention.
MiniDisc	Sony	Re-writable optical discs years before CD-R.	What is it with Sony and weird formats? MiniDiscs earned a weird reputation because no-one but Sony cared about them. So even though they offered a strong data storage option years before CD-R became cheap and widespread, adoption was miniscule.

and making arrangements for the use and promotion of their discs.

Until mid-2005, it looked like HD-DVD had the largest number of movie studios and other companies on board — and therefore stood the best chance of success.

But in late 2005 that lead evaporated, because studios like Paramount and Warner Brothers, while having committed to HD-DVD, had not made their commitment exclusive. As they saw momentum growing behind Blu-ray, both announced they would also support Blu-Ray and issue their movies on both formats. With Sony and Disney already on-board the Blu-ray bandwagon, and the might of electronics companies like Panasonic ready to crank out players, this was good news for Blu-Ray.

At the same time, computer companies started qualifying their support for Blu-ray. Recently, HP asked the Blu-ray team to include iHD and mandatory managed copy in its specification.

As the Blu-ray Association has cited the presence of Dell and HP — the world's number one and number two PC-makers — on its member roll as proof of its unstoppable market momentum, it seems unlikely this request will be rebuffed.

CONVERGENCE

These events led analyst company Forrester to declare that the battle between the two

Blu-ray looks set to be the heir apparent to DVD, but will other media formats render disc-based video obsolete anyway?

formats is over, with Blu-ray the winner.

"The reason is simple," writes the company's Ted Schadler in an October 2005 research paper entitled "Blu-ray will win a pyrrhic victory over HD-DVD".

"Sony learned from its painful Betamax loss that the format with the most industry support will win, and it set out years ago to assemble an impregnable lineup of partners."

Schadler also believes Blu-ray is technically superior to HD-DVD. "Three characteristics give Blu-ray its technological advantage," he writes. "(1) Blu-ray allows movie studios a higher level of copy protection (onerous to the PC industry and techie consumers, but reassuring to studios);

2) Blu-ray has more physical capacity than HD-DVD; and 3) Blu-ray's programming technology, Java, is a proven standard."

What Schadler does not mention is, as HP's request illustrates, Blu-ray is still a movable feast. So, even though it appears ascendant, there is every chance the eventual form in which Blu-ray reaches our homes will borrow many more features from HD-DVD.

But even if Blu-ray emerges as a hybrid (that removes the chance of another bout of Betamax madness), Schadler thinks the argument may well be moot.

"It will be another two years before consumers are confident enough of the winner to think about buying a new format... In the meantime, they will expand their video on demand (VOD), downloadable video, and Internet video habits."

This means the wait for the future of DVD has the potential to stifle demand for DVD forever; just another example of how much change Napster and Kazaa have wrought. DVDs, after all, seem sure to be upgraded. But the more profound upgrade to widespread video on demand will surely make the past few years' fussing over this format irrelevant. **apc**



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How Digital Rights Management works

Whether you like or dislike Digital Rights Management, it's slowly becoming unavoidable as more content is locked down digitally by creators. *Peter Sbarski shows how DRM works.*

The term DRM (Digital Restriction Management) is typically used to describe a collection of technologies and methods employed to restrict the use of digital media including, and not limited to, audio, video and text files.

Before DRM, encryption was used to guarantee safe and secure delivery of data. However, once this data was received and decrypted it could no longer be controlled. No one could regulate how this data was used and who used it. Digital Rights Management was therefore created to enforce restrictions and control over media after its delivery to the end-user.

Microsoft, Apple and Adobe, among others, have all tried to create their own DRM solutions. Interestingly, the efforts of these high-tech giants have not always been very successful (or unsuccessful depending on how you look at it). There is a perception that unbreakable DRM systems cannot be achieved in software (at least, not without necessary DRM-enabled hardware).

DRM systems can take a number of forms. DVD tracks which cannot be skipped are one such example. Here, however, we'll look at DRM when it comes to activating and using digital media acquired over the Internet.

A BASIC DRM PARADIGM

Different vendors implement their own DRM solutions always a little differently, but the main idea is often the same: a DRM-enabled file is usually encrypted. The user has to obtain a licence and a key in order to decrypt and use it. Licences often carry limitations in terms of what can be done with the file. One type of licence, for example, only allows the user to view the file. Another may allow the user to burn the file onto a CD. Typically licences are given to a computer rather than the user, so the term "authorised user" can also mean "authorised computer".

The technical overview of Windows Media DRM 10 for Devices published by Microsoft (see Inside Info, right) lists the following playback and licence expiration rights when it comes to playing media files on portable devices:

- AllowPlay: permits content to be played.
- PlayCount: the number of times this content may be played.
- BeginDate: the licence validity start date (licence is not valid before this date).

- DeleteOnClockRollback: if present in the licence and the clock is set back to an earlier time, this licence will be deleted.
- DisableOnClockRollback: as above, except the licence will be disabled rather than deleted.
- ExpirationAfterFirstUse: the amount of time following the first licence use that the licence will remain valid.
- ExpirationDate: the licence validity expiration date (licence not valid after this date).
- ExpirationOnStore: the amount of time a licence is valid after it is first acquired on a particular computer, in hours.
- GracePeriod: the number of hours that a device that has lost secure clock time may operate using its "best guess" time.

The procedure for acquiring a DRM licence and using a DRM-enabled file typically happens as follows:

- The publisher creates a DRM-enabled file by encrypting it to protect it from unauthorised access. Typically, a DRM-enabled file is fully encrypted except for a small part which carries the information about where the licence can be acquired from (like a URL, for example).
- The user downloads a DRM-enabled file and tries to run it. The media player which supports this particular DRM solution reads the file and checks if the PC has a valid licence.
- If a valid licence is found, the key contained inside the licence is used to decrypt the file.
- If a licence isn't found, the player tries to download the licence from the Internet. Depending on whether the user has an account with the publisher, the licence is either silently downloaded or the user is asked to register and provide payment details first. The licence is then downloaded and installed.

All licences are stored in a repository on a computer. Typically, licences are not transferable, so if you send a file to a friend, your friend will have to buy a licence to use the file. As mentioned before, different vendors have created their own solutions. Here, we'll look at Apple and Microsoft.

APPLE'S FAIRPLAY

The DRM solution created by Apple is used by the iTunes Music Store in conjunction with the

iTunes application and the iPod. Every track downloaded from the iTunes Music Store is encrypted with FairPlay DRM to prevent it from being played on unauthorised computers.

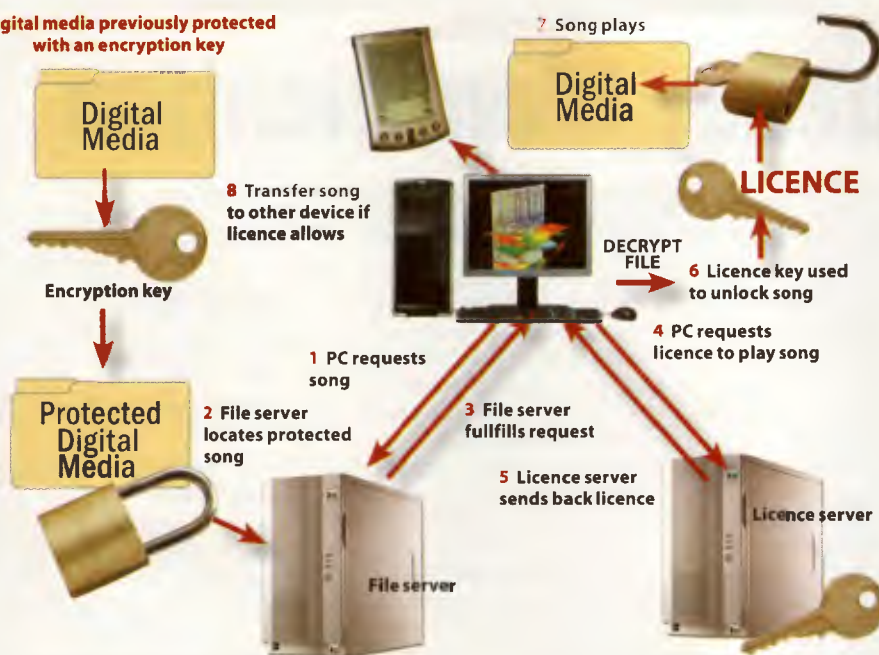
The FairPlay licence allows for the track to be copied to any number of iPods; to be played on five authorised computers; and converted to a standard audio CD track without any limits (but only seven times if used in a playlist). The playlist can, of course, be changed. The main aim behind FairPlay, it seems, is to lock out competing portable media players.

Apple's DRM process works in the ways as outlined below:

- All FairPlay-protected tracks are AAC audio files encrypted with the Rijndael-128 Advanced Encryption Standard (AES) algorithm.
- When a user buys a track from the online store, a random key (called the user key) is used to encrypt the AES key. In other words, the key which was used to encrypt the file is encrypted itself.
- The user key is stored on Apple's servers together with the account information of the user who bought it. It is also sent to the user's computer to be used by iTunes and, possibly, the iPod.
- iTunes stores the user key in a repository encrypted with a system key. On a Windows machine, for example, the system key is a hash of information which includes the processor name, BIOS version and the Windows version.
- Whenever a user wants to play a file, the system key is used to decrypt the user key which in turn is used to decrypt the AES master key.
- In order to receive the user key from Apple, the computer has to be authorised. When a computer is authorised, Apple sends all appropriate user keys to the user's computer.
- When a computer is de-authorised, iTunes deletes all user keys from the repository and informs Apple's servers that this machine was de-authorised.
- As mentioned above, five machines can be authorised to play all tracks bought by the user.
- Tracks can also be copied to iPods. On an iPod, the system key is the iPod's hardware identification number.

The reason why many experts scorn DRM solutions is because many of them have been

Digital media previously protected with an encryption key



cracked. Jon Lech "DVD Jon" Johansen of DeCSS fame was the first to crack FairPlay DRM. The Hymn Project has come up with an application to free FairPlay protected files of, well, FairPlay. Check out the links in Inside Info (right) in order to find out more.

WINDOWS MEDIA DRM

The Windows Media DRM uses a standard approach when it comes to rights management for digital media files. Content owners encrypt files and provide users with licence files which house embedded keys. The way everything works in Microsoft land is as follows:

- The content owner prepares a packaged DRM-enabled file by encrypting it with a key made from a Licence Key Seed and a Key ID (KID). The Licence Key Seed is kept secret and is only known to the content owner (or the party that generates the key). The Key ID is created anew each time and is included in the DRM-enabled file.

- The content owner also prepares a licence file and an embedded key. The embedded key, similarly as before, is made up from a Licence

Key Seed and a Key ID from the packaged file. The licence is prepared to specify use instructions such as how many times the file can be played, expiration date, whether the file can be burned, etc.

- The user downloads a DRM-enabled file and tries to open it. The system checks for a licence and, if it's not present, tries to acquire it from the Web.

- When the licence is acquired from the licence server, the key embedded in it is used to decrypt the file. Obviously, before this can happen, the rules specified by the licence have to be met.

- The content owner (or the licence server) doesn't need to keep a bunch of licences for each file. A licence can be dynamically generated. All that's required is the Key ID which can be obtained from the DRM-enabled file stored on the user's computer.

Actually, pretty much anyone can use the tools provided by Microsoft to create DRM protected files. First, you need a Windows Media Encoder which works with DRM to encode your files. Then you need to sign up

INSIDE INFO

- How DRM Works by Adobe
www.adobe.co.uk/epaper/features/drm/howdrmworks.html
- Windows Media DRM
www.microsoft.com/windows/windowsmedia/drm/default.aspx
- Architecture of Windows Media Rights Manager
www.microsoft.com/windows/windowsmedia/howto/articles/drmarchitecture.aspx
- Technical Overview of Windows Media DRM 10 for Devices
www.microsoft.com/windows/windowsmedia/knowledgecenter/technicalarticles.aspx#digitalrightsmanagement
- iTunes Computer Authorisation
www.apple.com/support/itunes/authorization.html
- The Hymn Project
www.hymn-project.org/
- Wikipedia's Entry on DRM
http://en.wikipedia.org/wiki/Digital_rights_management

with a licence provider which will dispatch licences to your clients.

Sometime ago, a crack for MS's DRM appeared on the Internet. This method required the licence to be available on the computer for it to work. It scanned the memory, acquired the seed and the KID, and created a .KEY file. It then became possible, with the use of the .KEY file, to extract the actual media from its package. Microsoft nevertheless managed to quickly patch everything up. Right now, MS has the upper hand — but for how long? **FILE**



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Radio Frequency Identification

Imagine the day when you can just fill up your shopping trolley and head out the door: *Peter Sbarski* explains how RFID transmission works — and why the barcode's day is nearly done.

Browsing the Web, one can't help but see headlines such as "RFID could revolutionise patient safety" and "Passports to get RFID chip implants". In the next few years, Radio Frequency Identification (RFID) will become ubiquitous; so pervasive in fact, expect to find an RFID tag embedded in your carton of milk (or in your underwear). Greg Pottie, an electrical engineering professor from the University of California said recently, "It's possible to set up these systems so that there is no privacy anywhere". (There's even a body responsible for RFID regulation: the Australian Communications Authority.)

As you can see, RFID technology can generate controversy but it can also be immensely useful, for everything from inventory control to cashier-less shopping (this might happen sooner than you think).

THE INNER WORLD OF RFID

There are two major components to a RFID system (both equipped with an antenna): the reader (transceiver) and the tag (transponder). The reader's antenna outputs a radio signal in order to "awaken" the tag. When a tag is

brought into the electro-magnetic field produced by the reader, it loads up the available data it has stored and transmits it into the world. Typically, this transmission is done by backscattering the signal from the reader (for passive tags) or broadcasting it like a cell phone (for active tags). The transmission from the tag is picked up by the reader and then subsequently demodulated, checked for validity and decoded. Finally, data is passed to the host computer.

An RFID tag is typically a very small object composed of a microprocessor, a metal coil (or another conductive substance, which makes up the antenna) and an encapsulating material which holds everything together. RFID tags are essentially very small radio receivers and transmitters. There are four types of tag: passive, active, semi-passive and chipless.

PASSIVE TAGS

Passive RFID tags are powered by the electro-magnetic field produced by the reader. They don't have an internal power supply of their own. Passive RFID tags typically have a lower maximum

range, use simpler integrated circuits and store less memory than their active cousins. Passive tags modulate the electro-magnetic field (backscattering the signal) produced by the reader in order to transmit data. Backscattering, in layman terms, is reflecting back a modulated signal. Passive tags can be split into two groups: inductively coupled and capacitively coupled.

Inductively coupled RFID tags use the magnetic field produced by the reader to power themselves. The reader has to produce a consistent and strong high-frequency magnetic field. The circular metallic coil found inside the tag acts as an antenna. The operating frequency is usually set at 13.56MHz; the maximum reading distance between the tag and the reader is approximately one metre. The tag's read distance depends on the size of the coil. If you're looking for a more technical discussion about operating frequencies, electro-magnetic fields and all things RFID, check out the links in the Inside Info (above). Inductively coupled RFID tags are more expensive to manufacture than capacitively coupled tags (but they

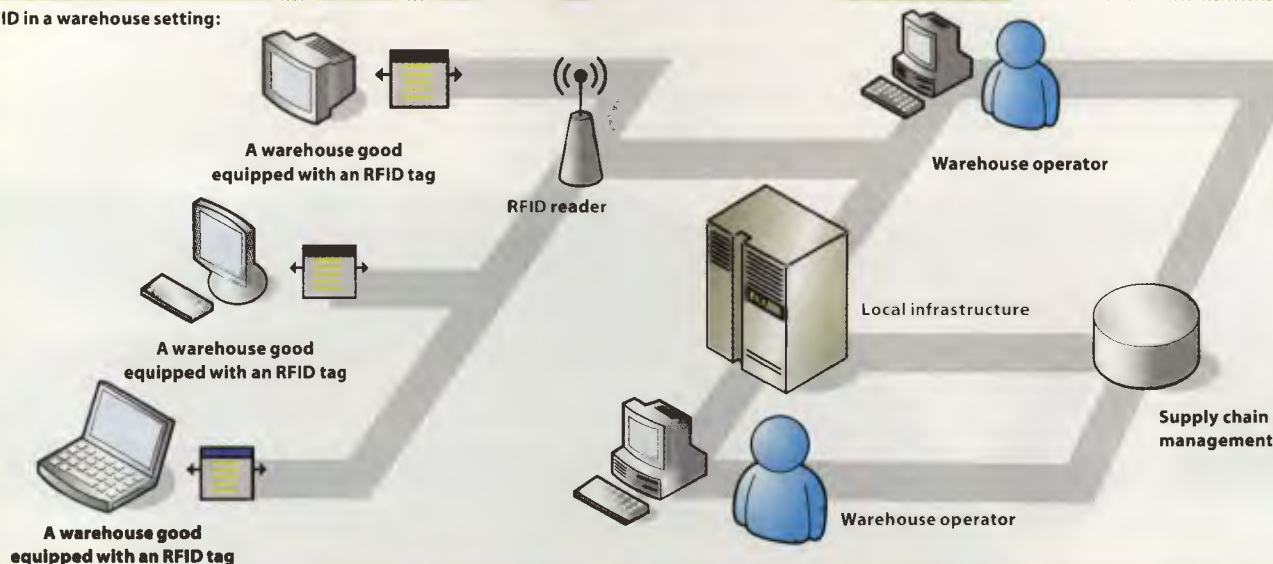
INSIDE INFO

- How RFID works
<http://electronics.howstuffworks.com/smart-label1.htm>
- RFID Journal
www.rfidjournal.com/
- Wikipedia on RFID
<http://en.wikipedia.org/wiki/RFid>
- Overview of inductively coupled RFID systems
www.rafsec.com/rfidsystems.pdf
- RFID Handbook
www.rfid-handbook.de/

are more powerful and have a longer range).

Capacitively coupled RFID tags are powered by changes in the electric field produced by the reader. These tags are very small and require a very small amount of energy to function. They don't require large activation currents, and can be powered by the human body. Special conductive carbon ink can be used as an antenna rather than a metal coil.

RFID in a warehouse setting:



CONNECTING WITH SUCCESS

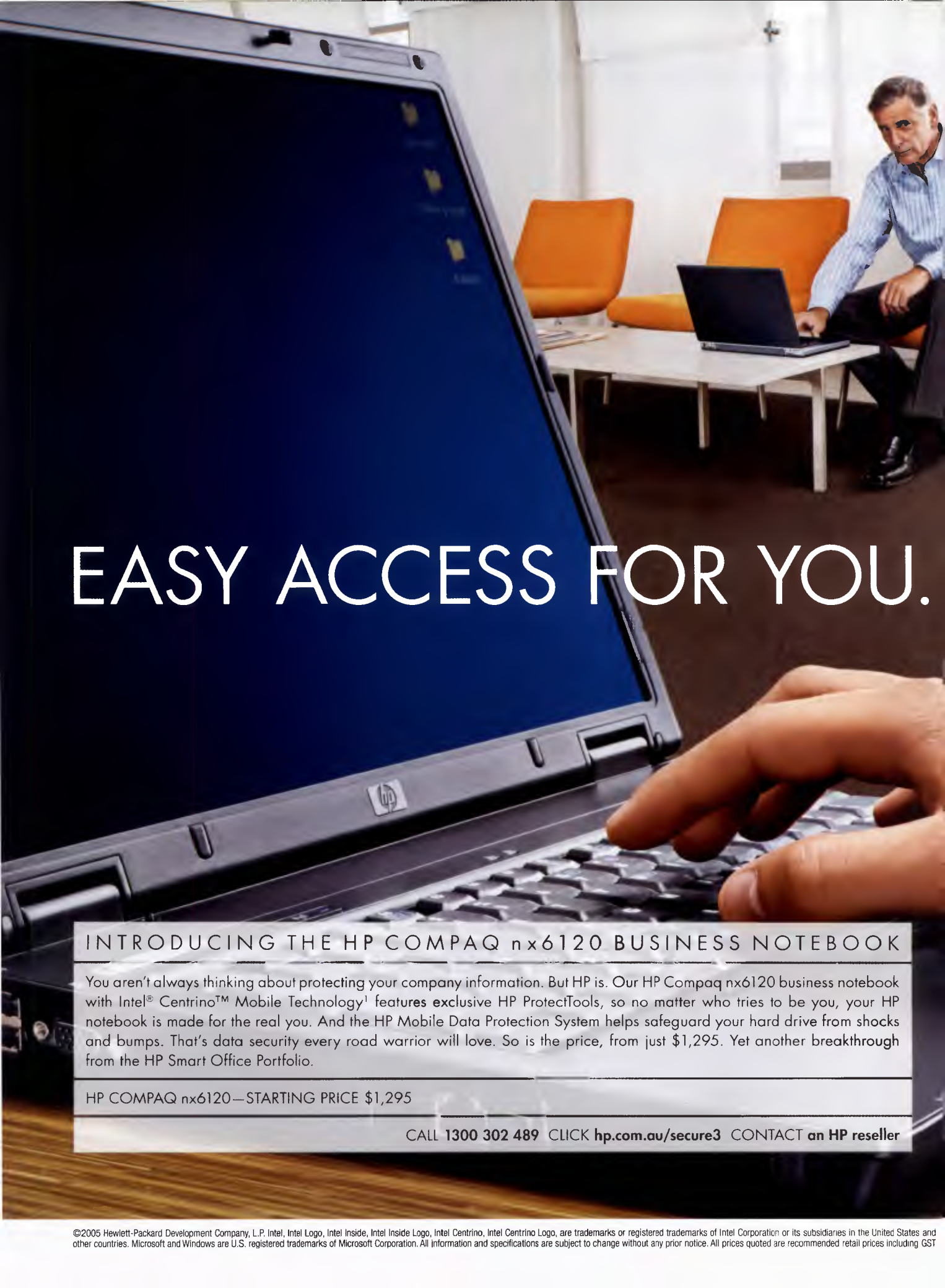
Today's mobility solutions from HP enable businesses to strengthen bonds with customers, increase productivity, streamline operations and drive competitive advantage.



For many aggressive small and midsize businesses, not being mobile may be competitively equivalent to marching backwards. These companies realise that their employees' ability to securely access information and transact business quickly while away from the office can give them a competitive advantage. Their logic is simple: mobility leads to productivity, and productivity creates business benefits and value.



Cookie Time is a perfect example of this trend. Based in Christchurch, New Zealand, Cookie Time manufactures, wholesales and distributes the number-one cookie brand in the country. To reach the largest possible marketplace, it uses 44 mobile distributors working a wide range of geographical domains.



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Successful as it is, Cookie Time was not satisfied with the status quo. To maximise the effectiveness of its mobile distribution network, the company turned to HP and HP business partner ROCOM Wireless for an end-to-end mobile printing solution for its distributors' vans.

"Being mobile, we realised our distributors would certainly be more effective if they had the ability to print and access data on the move," says Chris White, Cookie Time's manager of information systems.

Under the old system, Cookie Time distributors issued handwritten invoices to customers, entered sales details into a book, tallied invoices at the end of the day, then faxed or mailed them back to the office. Once at the office, data would be reentered by office staff.

So Cookie Time enlisted HP's help because, according to White, "HP was top of mind for us as the leader in imaging and printing technology. We naturally turned to HP when it came to looking for a reliable, effective solution that would bring value to our business."

BUSINESS BENEFITS

The resulting mobile digital printing solution consisted of an HP Deskjet 450 infrared- and Bluetooth*-enabled mobile printer installed in each distribution van, as well as SalesLink software for near-realtime access to order processing and inventory update information. Used in conjunction with smartphones, the mobile printers generate invoices and sales reports through infrared connectivity. The solution integrated easily with Cookie Time's existing IT infrastructure, minimising the burden on IT staff.

Says White, "As a robust, fully integrated and economical system, HP's solution has made life simple and has allowed our sales force to be truly mobile, and for its size, the HP Deskjet 450 has delivered on its promise of reliability, page economy and performance."

Cookie Time's business benefits have been bountiful. Distributors save up to an hour a day and mini-

mise inaccuracies, which allows them to spend more time with customers. Perhaps the most productive benefit of the new mobile printing system is the ability to gather near-real-time market data that facilitates market analysis, decision-making and inventory planning.

HP is expanding its mobile offerings, including new and enhanced HP iPAQ Pocket PCs and a mobile printer, to make it easier than ever for active professionals to stay connected and be more productive while on the go.

The introductions include the all new HP iPAQ rx1950 series Pocket PC, a stylish and affordable iPAQ combining integrated wireless* technologies, music, photo and digital video capabilities with a sleek design; an enhanced HP iPAQ hx2000 series Pocket PC, including the powerful HP iPAQ hx2790 with a biometric fingerprint sensor; and the new HP Deskjet 460 mobile printer, making printing from a notebook or handheld easy from virtually anywhere, and upgrades to Microsoft Windows Mobile™ 5.0 for select HP iPAQ models.

"HP is rising to meet the needs of a mobile world that is constantly evolving," said Ted Clark, senior vice president and general manager, Mobile Computing Global Business Unit, HP. "As work and play environments increasingly blend, HP is striving to deliver mobile solutions that address the diverse technology needs of our customers."

* A standard WLAN infrastructure, Wi-Fi infrastructure, other Bluetooth-enabled devices, separately purchased equipment, and a service contract with a wireless airtime provider may be required for applicable wireless communication. Wireless Internet use requires a separately purchased service contract. Check with service provider for availability and coverage in your area. Not all web content available.

The solution also has direct bottom-line benefits. White concludes, "We believe the benefits of building customer confidence as well as collecting important sales data for decision making would help us break even on our initial investments within 12 months and generate incremental sales in the future."

THE IT SIDE OF MOBILITY

Just as important to the success of any mobility solution is the IT side of the equation. IT professionals must deploy reliable, dependable, affordable mobility solutions that enhance the business. These solutions must be a natural extension of existing infrastructure, they must augment key business applications, and they must be secure, manageable and easy to use.

Otherwise, any solution—rather than enabling IT staff to support the needs of the business—will cause integration and support headaches.

One of the keys to the success of the Cookie Time solution was its easy integration with the company's existing IT systems. Teachers in Queensland are also reaping the rewards of an easy-to-use mobility solution.

Rural QLD-based teacher Mark Harm is one of 800 teachers using HP iPAQs as part of the ICT Explorer's Project, rolled out by the Queensland Department of Education and the Arts.

Teachers are using HP iPAQs and Pocket PCs to move from traditional, paper-based classroom management to secure and reliable electronic teaching. For many teachers, the devices carry information such as class rolls, academic records and reports.

Harm – who heads the technology teaching department at Gayndah State High School – uses an iPAQ to organise his week, plan lessons and manage his student assessments on the fly. He has also developed a range of database applications using the Syware Visual CE Enterprise Edition software package including a Unit Planner application.

"With the unit planner software, I will be able to plan an entire teaching unit, breaking it down into individual lessons that I can download to the iPAQ and use to teach the lesson," said Harm. "After the lesson, I can upload notes or changes back to my PC. And at the end of the unit, I'll have a complete record of what was planned, as well as what actually hap-

pened, along with notes and records about the students' performance and progress," he added.

For teacher Simone Coogan, an iPAQ enables her to create new ways to teach and engage with students. "In my extra role as curriculum coordinator, I go to lots of meetings and I use the iPAQ to take notes and upload the minutes to our intranet for the other teachers and parents. The device has great potential - I plan to incorporate voice recordings for meetings and integrate sounds files and digital photography for an ad campaign project with the students," Coogan said.

MANY CUSTOMERS, MANY IDEAL SOLUTIONS

Mobility, like most applications, must be shaped by a business need—there is no "one-size-fits-all" scenario. It starts with understanding business needs and objectives. Only then is it possible to determine the right mobility strategies and the right technology fit.

That fit may or may not initially include wireless solutions. As mobile technologies converge and connectivity options become more available, it will be easier to spot the right wireless opportunities. In the meantime, companies should remember that mobility is about solutions and solution providers that address business needs.

Many companies use a combination of different devices to create complete, on-the-go solutions. Two such organisations are Sloane Realty of Charleston, South Carolina, and Albert Almeda Publicitat of Girona, Spain.

Sloane Realty Broker Associate J. Warren Sloane turned to HP solutions to help make him more mobile and his agency more productive. By nature, the real estate business involves lots of paper, such as drawings, notes and contracts. But, says Sloane, "It's difficult to maintain a rapport with clients when you're digging through a box of folders in the trunk of your car."

Sloane's new mobile office includes an HP Compaq Tablet PC,

HP Deskjet 450 mobile printer and an HP iPAQ Pocket PC. An associate uses an HP Business Notebook PC to drive the agency's new business, Charleston Virtual Homes, a company that handles internet marketing for other real estate professionals.

"My HP Tablet PC is changing



the way I conduct business," Sloane explains. "When I'm doing a property management inspection, I use it every step of the way, taking pictures, importing them into the Journal and writing notes directly on them. I also print a copy of the inspection report on an HP Deskjet 450 mobile printer to leave with clients or send to the owners."

Everything that Sloane needs to do business is on his Tablet PC or online. He can fill out contracts in Journal, add special clauses and even capture signatures from clients on the spot. Then, back in the office, there's no need to enter contracts manually, since they're already in electronic format.

"I can honestly credit the HP Tablet PC with helping me close more sales," Sloane says. "For example, you're showing properties and the clients fall in love with a particular place. If you don't have a contract with you, you have to put them off to tomorrow ... With the Tablet PC under my arm, I have instant access to all the contracts I need and can get them signed in minutes."

Sloane uses his iPAQ Pocket PC for scheduling, email and contacts, further increasing his productivity, which he estimates has gone up 10 percent with the Tablet PC alone.

"HP products have solved some of my most difficult business problems without a lot of hassle," Sloane elaborates. "They leave me free to focus on my core business, property sales."

Another company that uses HP technology to help serve its clients better is Albert Almeda Publicitat, a media company that specialises in helping customers create high-impact advertising campaigns. Since company founder Albert Almeda works alone and is out of his office most of the time, he needed a mobile solution that would allow him to access his centralised data no matter where he was working. That's because he was losing existing contracts and failing to win new business since he couldn't access the data that he needed unless he was sitting in the office.

The answer was a solution that included an HP iPAQ Pocket PC, an HP notebook running Microsoft® Outlook, a Vodafone mobile phone featuring Bluetooth technology and Symantec AntiVirus software to protect the whole package. Now Almeda carries all the information he needs on his iPAQ, which can be connected to the internet via the mobile phone. Data—which includes everything from contact information to radio commercials in MP3 format—can be synchronised with Almeda's notebook quickly and easily, so it's always up-to-date.

"The significant time saved by this implementation is valuable in terms of increasing revenue and has allowed me to become more flexible and focused in building client satisfaction and loyalty," Almeda notes. "HP, Intel®, Vodafone, Microsoft and Symantec made my mobile office possible. It's a huge advantage having your entire office inside your pocket and accessible through such simple tools."

Other solutions HP provides that make it even easier to stay productive while on the go are mobile printing tools. Downloadable for free, these tools include Mobile Printing Software for Pocket PC (www.hp.com/go/pocketpcprint) and the HP Mobile Print Driver for Windows



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(www.hp.com/go/mpd4w).

COMMON THREADS

As we've seen, the power behind mobility lies in the ability to change the way work gets done, so employees are more productive and the business gets better results. Here are some common elements that small and midsize businesses should demand from their solutions and solution providers:

1. Simplicity.

HP mobility solutions offer simple ways for businesses to be more productive—from flexible purchasing options that make solutions easy to own, to local expertise that makes solutions easy to customise and implement.

2. Security.

Mobility solutions that don't protect data can jeopardise a business. That's why HP offers safer ways to help control and protect data while mobile. HP offers the latest encryption technology in its mobile devices as well as access controls on many of its products. And HP's partner network of over 3,000 local experts can help companies find the right security solution.

3. Seamless connectivity.

Mobility is all about enabling access to business critical data. HP solutions provide better ways to connect across voice and data networks through features like self-sensing connectivity. HP also works with over 200 global network service providers, including T-Mobile and Starbucks.

THE HP MOBILITY VALUE PROPOSITION

HP has a vast repository of mobility experience and expertise. Its combination of technology partnerships, product offerings and global channel partners puts the company in a unique position to meet customer needs. HP's portfolio of proven, mobility-enabled products includes desktops, notebooks and handheld PCs, servers and storage systems, and networking and management software designed to accommodate mobile customers



without increasing IT's workload.

Services are also important. With HP's worldwide network of 70,000 partners, customers can access HP mobility services when and where they need them, from the provider of their choice. Through HP's certification program, customers can expect consistent, high-quality service.

One organisation that provides a great example of HP end-to-end expertise and solutions at work is Wesley Mission, the Sydney-based city ministry which is one of Australia's largest humanitarian organisations.

"Although the visible aspect of our organisation is working directly with people, like all businesses we are strongly IT dependent and couldn't function effectively, continue to grow or provide our quality services without our extensive HP suite of products," explains Peter Mann, Wesley Mission's IT Manager.

HP technology is used throughout the organisation, with more than 1,000 HP desktops and 100 HP ProLiant servers installed across the state, along with a wide range of notebook, iPAQ and Tablet PC solutions for mobile workers. Wesley has utilised HP systems since 1995, and in 2000 committed to an across-the-board HP implementation.

Reliability is a critical factor, especially for Wesley's Lifeline telephone counseling service, which handles more

than 22,000 phone calls each year and depends mostly on volunteer staff.

"If one of our Lifeline volunteers has a potential suicide victim on the line, they need immediate, real-time access to information, databases and management support, including emergency services," says IT Operations Manager Ninos Khamo.

The dependability of HP technology has also allowed Wesley to redeploy its older systems for Internet cafe systems.

"We are not a rich organisation, and every penny spent on technology must earn its keep -- we need to see value for money," Khamo says. "I am confident in HP because I know our upgrades are state-of-the-art, but also that the products will last us a long time."

Today, HP mobility solutions are enabling remote and mobile workers to access information and business applications away from their desks. Employees are using this newfound advantage to work more productively, better satisfy their customers and generate more sales. HP understands mobility. It also knows how to design hardware, applications and services

that meet the needs of mobile workers and the IT departments that support them.

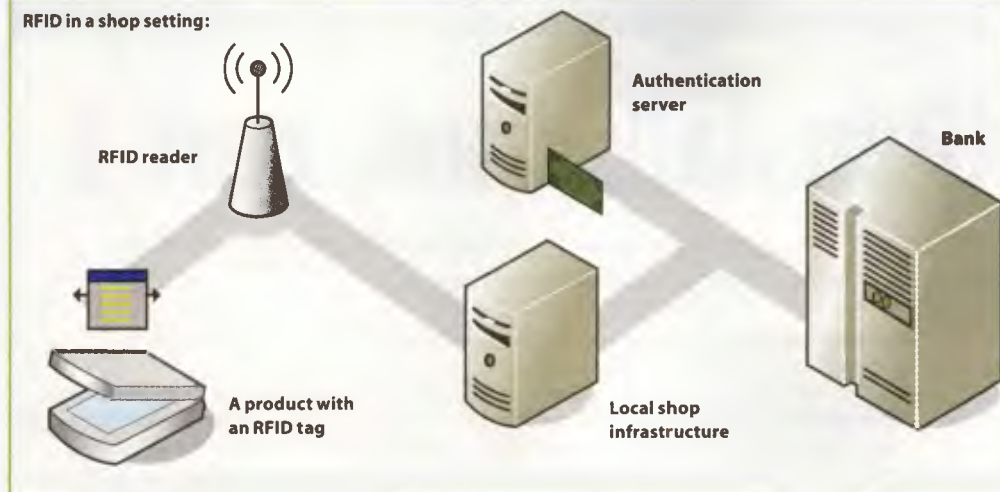


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RFID in a shop setting:



Capacitively coupled RFID tags can, at the moment, only store about 100bits of data (but they can be in-printed onto paper and their cost is very little). Unfortunately, their range is also very small. The reader has to be within approximately 1cm of the tag for it to work.

Since passive RFID tags don't require a battery, their cost is relatively low. They are durable and simple to assemble, and have a long lifetime. They can also be made extremely small. There are passive RFID tags with a die size of some 0.25mm² that are about as thin as a sheet of paper.

ACTIVE TAGS

Active RFID tags come with a battery which is used to power the tag and generate (and amplify) the outgoing signal. These tags can typically power more capable microprocessors than their passive cousins and store more memory. Active tags sport longer ranges (up to 90 metres and sometimes even

more) and may carry extra sensors (which have a need for power). Depending on the tag, the internal battery may last for about 10 years. This makes the lifetime of an active tag shorter than that of a passive tag. Nevertheless, all the other benefits make active RFID tags the perfect solution to the instantaneous supermarket checkout dream. Active RFID tags are also able to initiate communications and execute diagnostics and independent monitoring. Obviously, the data bandwidth in an active tag is a lot higher than in a passive tag. Active tags can work with a low RF signal (125kHz - US or 134.2kHz - International) since the reader doesn't need to power the tag.

Unfortunately, active RFID tags are still a little expensive to produce, and there are some size issues (a typical active tag is about the size of a coin). Still, these issues will likely be solved: expect to see active tags in a store near you soon.

SEMI-PASSIVE TAGS

Semi-passive RFID tags use a very small battery to power themselves, enabling them to concentrate solely on backscattering the signal. In reality though, semi-passive tags still use the RF signal to power themselves. The battery helps to extend the range and execute some other functions (eg. monitoring of surrounding conditions such as temperature) but not much else.

CHIPLESS TAGS

Chipless RFID tags don't carry a microprocessor or any integrated circuits; they work by reflecting the signal from the reader. The unique return signal, the signature, is used to identify the tag. Chipless RFID tags may also, in this way, convey information as to whether they are broken (if the signature is incomplete or corrupt). They are cheap to produce and are less sensitive to RF interference than other types of tags.

COMMON RFID PROBLEMS AND SOLUTIONS

RFID systems suffer from a number of problems. Firstly, electro-magnetic interference (EMI). A simple pager or a mobile phone can cause problems. Secondly, tag collision, which can happen when two or more tags backscatter the signal at the same time (thus confusing the reader). This type of collision can be solved by making tags wait for a random amount of time before transmitting. Anti-collision algorithms may also be employed by the reader to help solve this problem.

A third problem is reader collision. This occurs when a signal from one reader overlaps with a signal from another. One way to solve this problem is to make readers read at different times. Also, if the readers overlap — and the same tag is counted twice — this must be noted and taken care of. Metal objects in close vicinity to the tag and the reader can also cause interference; water can impede signals (especially when very high frequencies are used). These issues can be solved, at least partly, by using low-frequency tags.

THE OUTER WORLD OF RFID

Without a doubt, RFID works better than simple barcodes. Tags don't have to be positioned to look directly at the scanner (no line of sight is required) and, providing the system is set up properly, multiple tags can be scanned very quickly. RFID is not a brand-new technology, but only now is it becoming practically affordable and powerful. The next five to ten years could take us to a new world indeed. **EDIT**



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Remote XP installations, part 1

Installing XP from CD is traditional — but why not take advantage of today's networking technologies to do it over the wire? *James Bannan* shows you how.

SKILL LEVEL

● Intermediate

REQUIREMENTS

- Second computer to act as share point; Windows XP CD; Windows XP Deployment Tools; Windows 98SE/ME/XP bootdisk; Boot Disk Essentials; Bart's Network Bootdisk 2.7; Unattended 4.6; Unattended DJGPP support files.

TIME TO COMPLETE

● 2 hours



JAMES BANNAN

James Bannan moved to Australia from England in 1982, but remains a stubborn Yorkshireman to the core. He graduated from Melbourne University with a BA/BCom in 1999 and went straight into IT. James worked as a support consultant at Pricewaterhouse Coopers for over three years before moving to St Leonard's College as a systems manager. Outside of work, James is a competitive ballroom dancer.

Remote install sources have a huge advantage over traditional installation methods as the files exist on a remote network share — so are easy to keep updated with the latest drivers, service packs and hotfixes. The downside is that they require a couple of extra steps to get running.

This month, we'll deal with installing XP from a network share point — just a basic file share on a computer which isn't necessarily a server. First we'll use a standard network bootdisk with drive mapping, and then I'll show you a more intelligent application to streamline the process.

GROUNDWORK

Installing from a network share obviously requires a share to be available. On the computer where the installation files will be available from, create a folder called Deploy. Share this folder and copy the i386 folder from the Windows XP CD into the share — the structure should look similar to C:\Deploy\i386.

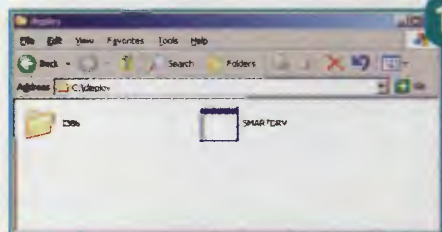
Next, use the Boot Disk Essentials disk image to create a floppy disk with the contents of the image. ❶ Copy all the files to a folder, making sure to copy SMARTDRV.EXE to the C:\Deploy folder.

❷ Create a user which has access to the share, at both the share level and the file system level:

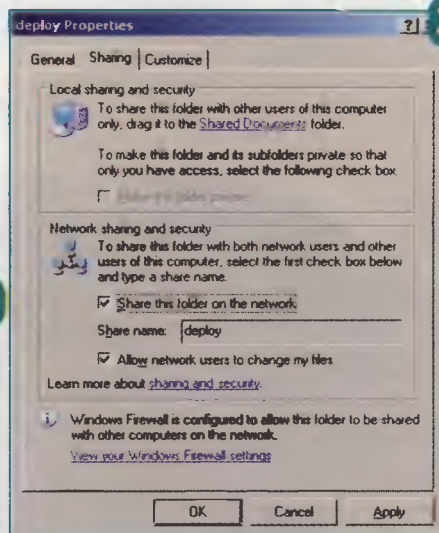
- Go into Windows Explorer > Tools > Folder Options.
- Go to the View tab, scroll to the bottom and make sure that Use simple file sharing is ticked.
- Right-click My Computer, select Manage, expand Local Users and Groups > Users.
- Right-click the righthand pane, select New User.
- Right-click on the Deploy folder in Windows Explorer and go to Sharing and Security.
- Click the Security tab, and make sure the new user has at least Read & Execute, List Folder Contents and Read rights to the folder.
- Click the Sharing tab, share the folder, click Permissions — ensure the user has Read rights.

Now to get the client machine ready — when installing Windows over the network we need to manually select a place for the installation files to be copied to. Using the Windows 98SE bootdisk (from www.bootdisk.com), boot the system and launch FDISK.

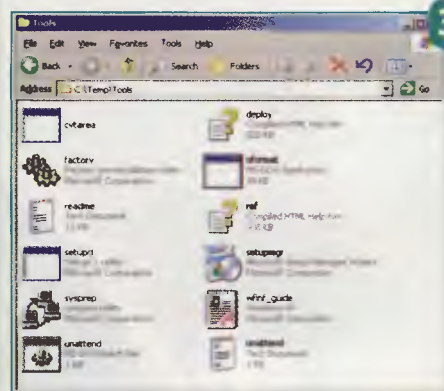
Time for some manual partitioning. The easiest option is to create a 4GB FAT partition and set it as the active partition. The problem is that even though you can convert this FAT partition to NTFS (and then extend it to fill up the rest of the unused space on the disk), it's inefficient. When you format the partition from the Windows 98SE disk, it uses the standard, older version of FORMAT.COM (with a cluster size much larger than the NTFS cluster). ❸ So, the best method is to use OFORMAT.COM, which ships in the Windows XP Deployment tools CAB file and can format a partition with FAT (using a cluster size optimal for future conversion to NTFS). The only drawback is that this only works



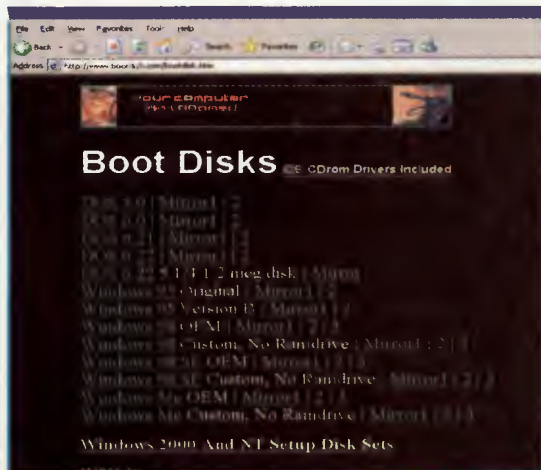
Make sure that SMARTDRV is present in the Deploy folder.



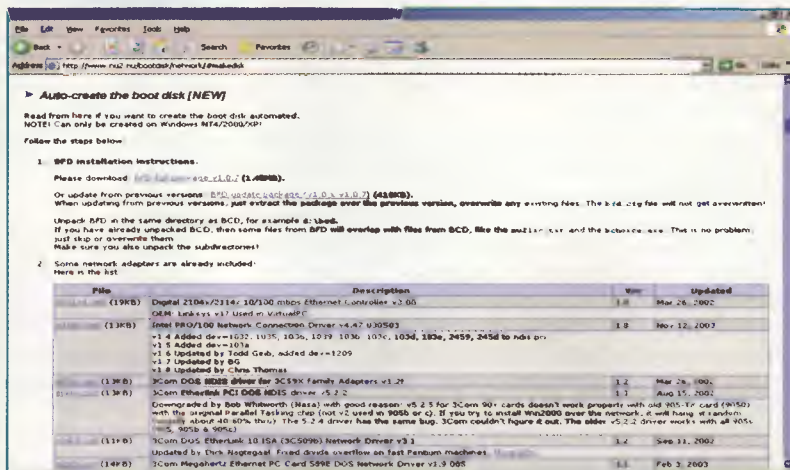
Just use simple file sharing — it gets the job done.



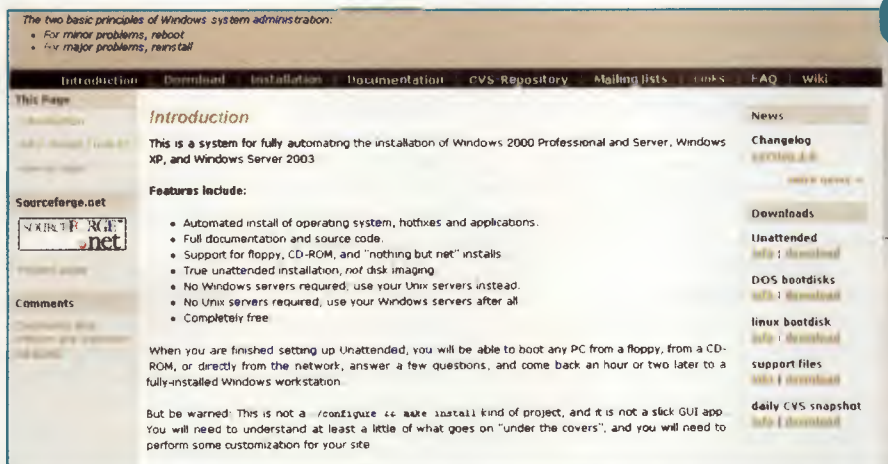
SETUPMGR and OFORMAT are vital tools.



www.bootdisk.com — an outstanding collection of Windows bootable disks.



Bart's Network Bootdisk — one of the best tools on the Net.



Unattended — an open source solution to a Microsoft problem!

from a Windows ME/XP-formatted disk.

④ Otherwise, you can either download a Windows ME bootdisk (www.bootdisk.com) instead of the Windows 98SE bootdisk (because it comes with FDISK) and copy the OFORMAT.COM file to the disk. Or you can create an MS-DOS bootable floppy within Windows XP and copy OFORMAT.COM to that disk.

When you've got FDISK up and running, the partition you set up is fairly independent of any other partitions you may already have on the primary disk. Of course, it's easier to just have the one partition, but more and more machines have multiple partitions for ease of data management. You need to delete whichever is the current active partition and then create the primary DOS partition. Reboot and format it with OFORMAT. The appropriate command line is **OFORMAT c: /q /a:8**. This does a quick format of the C:\ partition with a 4K cluster size for NTFS conversion.

⑤ Now to create an unattended answer file. Use the Setup Manager tool from last month (APC January, page 104), where we added into the [Unattended] section a line which reads **Repartition=Yes**. This converts the FAT partition to NTFS and extends it to take up all available space on the disk. ⑥ For a network install, add the following two lines in the [Unattended] section:

```
FileSystem=ConvertNTFS
ExtendOemPartition=1
```

You can use the ExtendOemPartition to specify exactly how much to extend the partition by. For example, **ExtendOemPartition=1 10000** will extend it by another 10GB. The default **ExtendOemPartition=1** extends to encompass the entire hard drive except the very last cylinder on the disk, so that you can convert to a dynamic disk later if need be. Once the unattend.txt is finalised, copy it to C:\Deploy\i386.

8 OVER THE WIRE

Now we're ready to connect the two machines and install XP. ⑦ Of the number of network bootdisks you can create, one of the best is Bart's Network Bootdisk (www.nu2.nu/bootdisk/network/). There is an automated disk creator which is particularly useful: download BFD full package 1.0.7 and extract the contents of the ZIP file to a local folder on the second computer. If your network adaptor isn't mentioned then you'll need to download the appropriate driver CAB. There's a large list of pre-built CABS on the Web site — chances are you'll find the one you need. If not, there's instructions on creating your own. Copy the CAB file you need to the \cabs\drivers\ndis folder amongst the extracted bootdisk files.

Next, open up a command window and navigate to the root of the bootdisk folder. Insert a floppy and type **bfd -t 144 msnet a:**, which creates a 1.44MB floppy image using the MS networking tools and transfers it all to the A:\ drive. It will also format the floppy first.

Now, boot the machine using the disk.

- On the first boot menu, select option three — boot without EMM386.
- Let the Network Client run without interaction (it has a 10-second timeout).
- Autodetect the network adaptor. If it doesn't pick it up you can manually choose the appropriate driver file from the disk CABS.
- Select TCP/IP as the protocol (this is default).
- If running DHCP, hit OK on the next screen; if not, type in the IP details for your network.
- In Identification Settings, enter an appropriate username/password which has an account on the remote computer.
- At the prompt, type in MSNET and hit Enter. Choose Map — make the drive Z and fill in the path to the remote machine and share. Don't

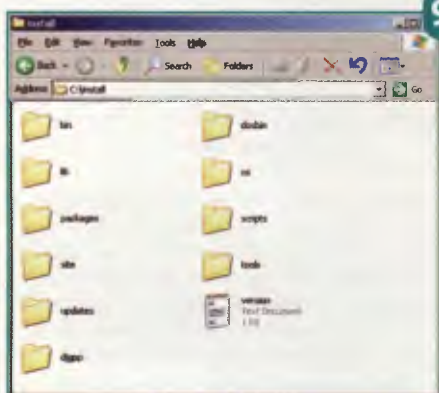


choose to Reconnect at logon.

- Change to the Z:\ drive — do a DIR. You should see the I386 folder and SMARTDRV.EXE. Launch SMARTDRV to enable write caching — if you don't do this, the file-copy process will take forever, and may even time out. Run SMARTDRV again to confirm caching status.
- CD into I386 and type `winnt /s:z:\i386 /u:unattend.txt`. The /s switch specifies the location of the source files, while the /u switch tells WINNT.EXE to use an unattended file (unattend.txt). Using the UNC convention to point to the install source is not recommended.

Eject the floppy. Windows will copy the necessary files to the FAT partition and reboot. It will then perform another file-copy process, reboot and then the GUI part kicks in. There's no denying that installing Windows in this manner takes a bit longer than a fully unattended setup from CD, but it definitely gets the job done. The only post-install task is to stop Windows asking you which operating system you want to boot from. To get rid of this:

- Right-click on My Computer > Properties > Advanced > Startup and Recovery > Settings.
- Under System Startup click Edit.
- In the operating systems, get rid of any line



The Install folder needs to be fully populated.

other than that which refers to Windows XP.

The legacy OS line may look like `C:\="Previous Operating System on C"`. Save the file and quit.

- You can also just directly edit `C:\boot.ini` (it's a hidden system file).

You can also link-in other tools like custom drivers. Just add the drivers into the install source and modify the unattend.txt file to reference them. This can create an install source suitable for multiple hardware platforms.

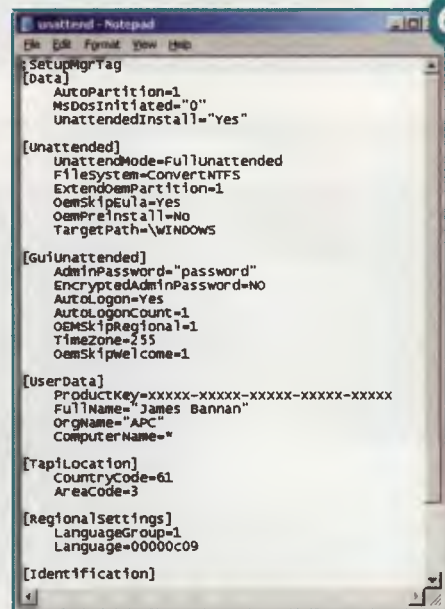
A LINUX SOLUTION?

OK, so it's a bit of a clunky process. The main problem is that there just aren't many decent tools to help you do network installs (without getting involved with server-side methods). Fortunately, there's an app called Unattended (<http://unattended.sourceforge.net>) which streamlines things considerably.

It's essentially a boot CD which looks to connect to a network share — the same as what we set up earlier. It assumes that you've put in place a particular structure of predefined folders and scripts, and steps you through the partitioning and formatting quickly and painlessly. It extends the functionality of remote unattended installs to include applications (for post-Windows installs of Office, DirectX etc.), and you can set up the network share to distribute multiple versions of Windows.

First, you need the main ZIP file (unattended-4.6.zip) and DOS boot files (unattended-4.6-dosboot.zip). There's a Linux boot file as well (for those using Samba), but we'll stick to Windows for now. Extract unattended-4.6.zip to `C:\tools\unattended` and unattended-4.6-dosboot.zip to `C:\tools\dosboot`.

By default, a machine booting from an Unattended boot CD will try to connect to `\\ntinstall\install`. This is the default configuration, but it can be overwritten at the file level or changed during the actual boot process. If



Add in the extra lines to [Unattended] to manage automated partitioning.

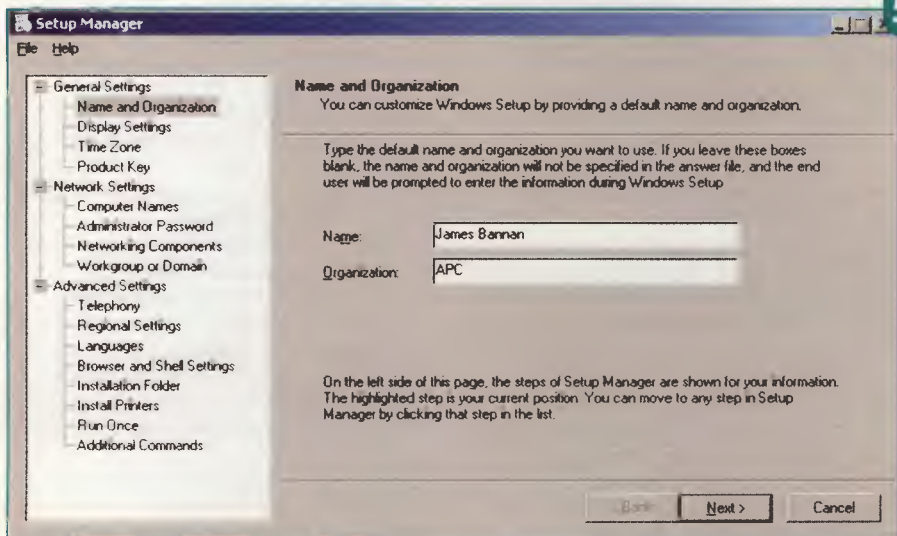
you're running DNS on your network then it's fairly straightforward to create a new CNAME reference for NTINSTALL without needing to change the hostname of the remote computer. On a small network with just one subnet, basic TCP/IP communications should be able to resolve any network name without the need for supporting infrastructure.

⑤ Create a folder on the remote computer called `C:\install`, and use simple file sharing to share it. Copy the contents of `C:\tools\dosboot` into `C:\tools\unattended`. This will overwrite the `C:\tools\unattended\bootdisk` folder. Copy the contents of `C:\tools\unattended\install` into `C:\install`. Within `C:\install`, create a folder called DJGPP (`C:\install\djgpp`). Extract into this the contents of the development kit, DPMI server, Perl port and Pico text editor support files, overwriting the existing files.

Unattended is geared towards streamlining the install process, coming with a pre-populated unattend.txt file located in the \lib folder. This is the name and location of the answer file it passes to WINNT.EXE during the install. However, it's not a complete answer file and the app is scripted to prompt you for particular questions during the install. Feel free to experiment with this, or just copy your created answer file across.

Now, create a folder within `C:\install\os` called XP and copy the i386 folder from the Windows XP CD to this point, creating `C:\install\os\xp\i386`. Next, if DHCP isn't running on the local network, you'll need to manually edit the appropriate disk image for your system (check out the Customising section below).

Finally, create a boot CD using the BOOTDISK.ISO file in `C:\tools\unattended\bootdisk`. This creates a bootable CD based on



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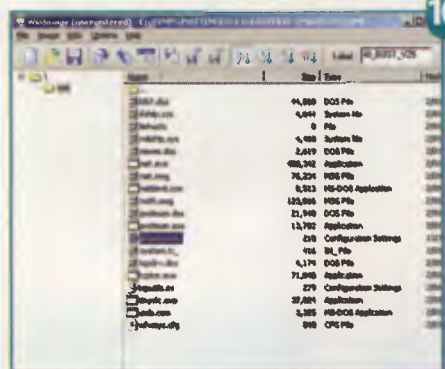
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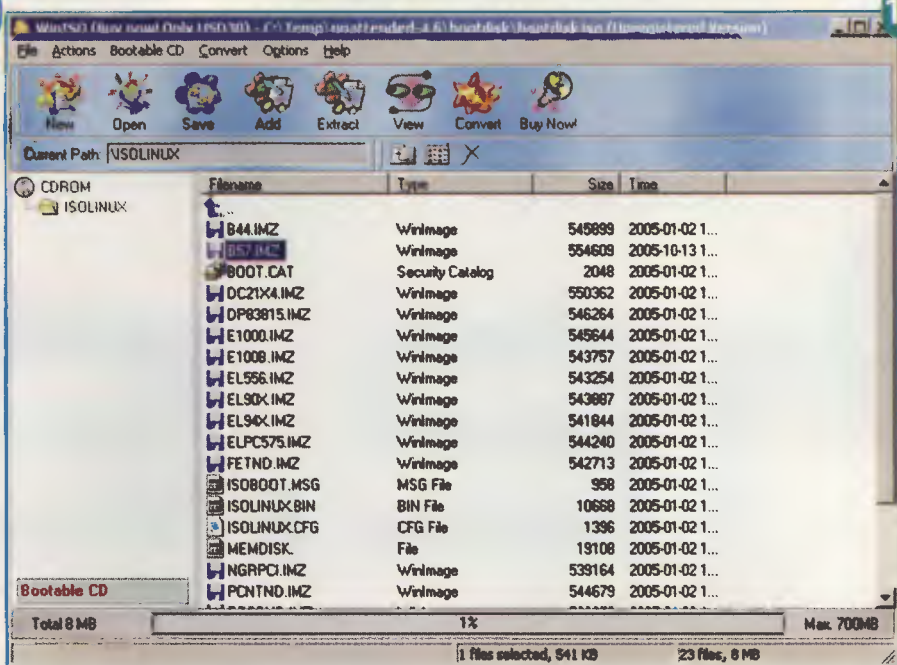


Edit the protocol.ini to modify the disk image's network settings.

isolinux, which is configured to connect to the remote share. Boot up the client machine with the boot CD in the drive:

- Choose the appropriate boot image for your network adaptor.
- When prompted to override the bootdisk defaults, press Y if the remote share is NOT \\ntinst\\install. If you press Y, you'll be prompted for the correct computer/share information.
- Enter the username/password required for the remote machine.
- The next step is the FDISK component which we performed manually earlier on. In Unattended it's fully automated. Press 1 for >8G HDD support.
- Choose 1 for the preset partitioning options, or select 2 to run FDISK manually — you will need to choose this option if you're running multiple partitions on the primary disk.
- If there are any partition changes to be made, the machine will automatically reboot.
- When the system loads again and you get to the partitioning section, select 1 (do nothing). Select Y to format C:\. Unattended uses FreeDOS FORMAT which supports the /a switch like OFORMAT to format FAT with a 4K cluster size for future NTFS conversion.
- Press Y to replace the MBR.
- Unattended then checks the \os directory for any instances of Windows, looking for the i386 folder. Once found it will check for any third-party drivers in the \$oem\$\\$1 folder.
- Press enter to skip entering any NTP server names (unless you want to).
- Press 4 to avoid installing any Windows customisations, and 2 on the next screen not to install any optional scripts
- Unattended then looks for the unattend.txt answer file in i386 and copies it to c:\netinst\unattend.txt. Select 1 to edit the file to make sure its contents match your original answer file. Press 4 to continue.

And that's it! Winnt.exe is launched and Windows gets installed based on your answer file. All-in-all it's a much easier and quicker process than the manual method (once you've performed the server-side preparation).



Use WinISO to insert the updated disk image into the CD ISO.

You can also leave the boot CD in the machine, as the CD boots from the local drive after a 30-second timeout at the network image selection screen.

STATIC IP NETWORKING

The IMZ files contained in the C:\tools\unattended\bootdisk\images folder contain the individual settings and drivers for each network image. In turn, these are contained within the BOOTDISK.ISO file. To edit an IMZ file you need an image editor like WinImage (www.winimage.com). It's shareware, but you can perform this process without having to register it. Open the IMZ file which is appropriate to your network adaptor and go into the \net folder contained within. Extract the PROTOCOL.INI file then open it in Notepad. Modify the lines under the [TCPIP] section to read:

```
NBSESSIONS=6
ADDRESS0=xxx xxx xxx xxx
DEFAULTGATEWAY0=xxx xxx xxx xxx
SUBNETMASK0=xxx xxx xxx xxx
DISABLEDHCP=1
DRIVERNAME=TCPIP$
BINDINGS=GEN_NDIS
LANABASE=0
```

xxx are the IP octets (note that unlike regular IP syntax, the octets are separated with spaces, not full stops — full stops will fail). Leave the [GEN_NDIS] section unchanged.

Save and exit Notepad. Go back to WinImage and select Inject — browse to the modified PROTOCOL.INI and overwrite the existing one.

Save the image and exit. ⑪ Now you need to add that file to the BOOTDISK.ISO file, and you'll need WinISO (www.winiso.com). Open up BOOTDISK.ISO and delete the appropriate IMZ file for your driver. Now click Add, and insert the IMZ file containing the updated PROTOCOL.INI. Use rename to make sure that the filename is all in uppercase to match the other image files. Save the ISO and burn it.

When you boot from the new CD and launch the image, it will register an IP address of 0.0.0.0 — don't worry, that's just a DHCP report. The static IP address will be working fine.

POST INSTALL

Once Windows loads for the first time, Unattended may, depending upon which options you've chosen, attempt to run some post-install scripts (dependent upon it being able to re-map to the remote server). If the machine you're installing to requires network drivers which aren't part of the base driver set, the action will fail. You must embed the drivers into the install point and modify the answer file.

Post-install scripts can include installations of Adobe Reader, OpenOffice or anything you care to script. Just copy the installation files into the appropriate path in the C:\install\packages folder, and select the option during the CD boot.

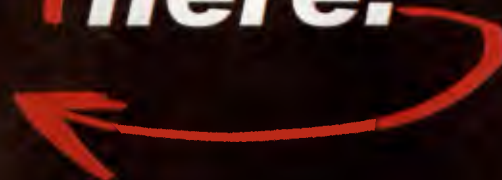
So that's unattended network installations: both of the methods described above are suitable for small networks. [ETC](#)

NEXT MONTH

- Next time we'll look at solutions for larger networks, including more automated and robust distribution methods.



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Mastering networking, part 7

Stephen Withers looks at the options available when your wireless base station doesn't have the reach you need.

SKILL LEVEL

- Beginner

REQUIREMENTS

- Varies

TIME TO COMPLETE

- Less than 30 minutes (for most changes).

IN THIS SERIES

- **Part 6 - January '06**
Adding Wireless
- **Part 7 - February '06**
Extending wireless range
- **Part 8 - March '06**
Budget peripherals



STEPHEN WITHERS

Stephen Withers has been writing for APC since its second issue. With a professional background in operations research and IT, he switched to full-time writing and editing in 1990. As much as he enjoys cutting code, he now has insufficient time for anything more complex than scripting. Stephen has been networking computers since the time when an Ethernet card cost more than a PC.

Wi-Fi networks have a notional maximum range of around 300m in the open air, but within a building that can fall to 40m or so. Solid walls, wiring, plumbing, large metal boxes — such as fridges or filing cabinets — and liquids (eg. an aquarium) will partially block the signal and reduce its range.

If you're planning to make the most of the warm summer evenings and sit in the garden with your notebook, be warned: some people report metallic window tints or flyscreens made with metal mesh reduce the signal strength.

Speed drops with distance, and you may only get full-speed operation within, perhaps, 30m. If you're only using the WLAN to access your Internet connection, it probably won't make any difference if the speed drops below the theoretical maximum, as the cable or ADSL speed will be the limiting factor. It's a different story if there's heavy local traffic.

MOVE ONE OR MORE ITEMS

The simplest and cheapest approach can be to move the access point (I'm using this term to include wireless routers etc.) or the device. Even a relatively small change in position can pay off if there was a specific obstruction, such as a fridge.

Locating the access point more centrally in the area to be covered often helps by bringing more of the premises into the signal's footprint. How many houses are bigger than 60m in any one dimension?

Mounting the access point on a wall (around 2m is a commonly suggested height) may also increase the effective range, though it may not be visually acceptable.

Adjusting the angle of the access point's omnidirectional (ie. transmit and receive the signal equally in all directions) antenna can make a difference. Vertical orientation gives the best range in a horizontal direction, which is ideal for single-level premises.

As the signal spreads vertically at a fairly shallow angle (around 30 degrees above and below the horizontal), coverage of another storey will be limited, and there may be a dead spot directly above and below the antenna. A horizontal antenna will give a good signal above, below and at right angles, but poor coverage along the direction of its axis.

1 A compromise is to set the antenna at an angle so the signal has a decent footprint on the floor where it is located, but still reaches into an upper or lower storey. If the Wi-Fi adaptor has a similar antenna, it may help

if it is adjusted approximately parallel to the access point's antenna.

CHANGE CHANNELS

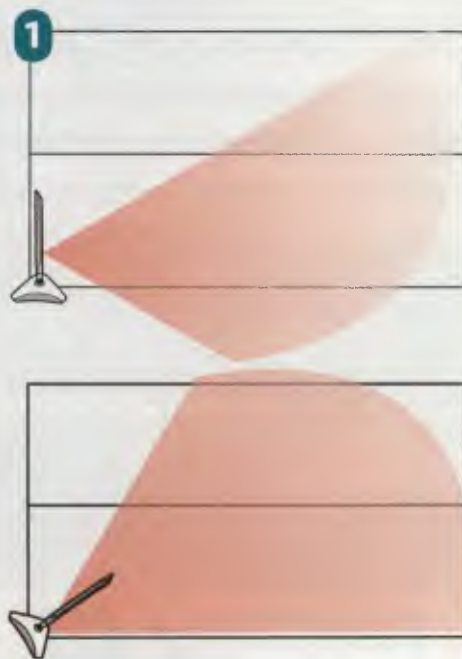
If a near neighbour has a wireless LAN using the same channel as yours, or if there are other devices operating in the 2.4GHz band, changing the default channel may reduce interference and thereby improve performance. See the instructions for your access point — it's usually a simple adjustment. 2 The Wi-Fi adaptors I've used automatically adjust to the access point's channel.

ANTENNA

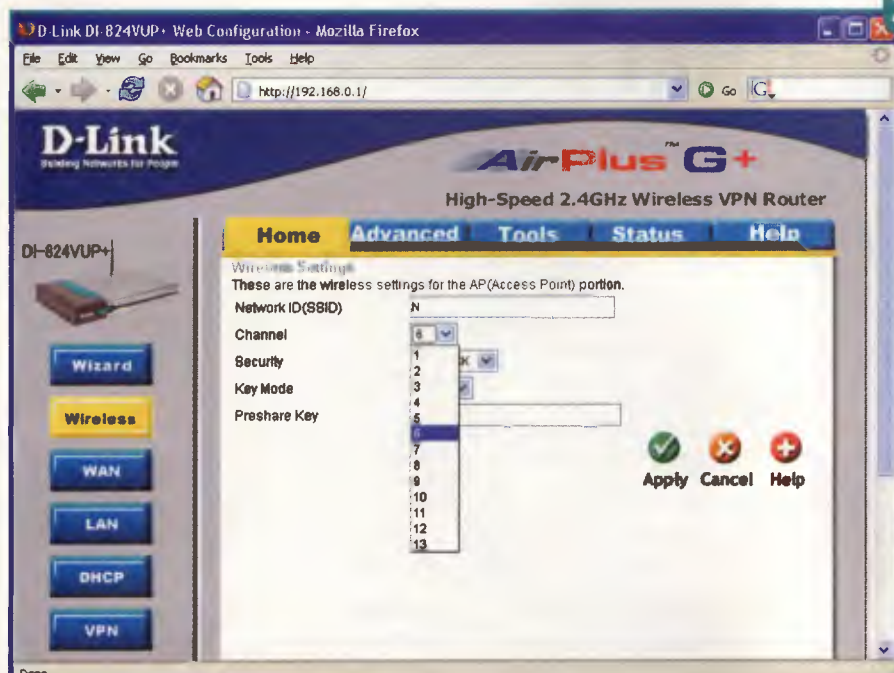
The antennas built into most access points and wireless interfaces are designed to be omnidirectional. Focusing the signal in the direction of the other unit will increase the range.

This can be achieved to some extent with a passive reflector, such as NetComm's Wireless Extender (\$29.90). I found a slight reduction in signal to the rear of the reflector and a corresponding increase in front of it.

The principle of improving range via the antenna can be taken further by fitting a higher-performance antenna to the access



Vertical antenna — poor coverage of upper storey. Angled antenna — gives good coverage of lower storey, but improves coverage of upper floor.



point (assuming it has the necessary socket). Various vendors, including ③ D-Link, NetComm and NetGear, offer directional and omnidirectional antennas for their products. Indoor and outdoor models are available; some attach directly to the access point, others are wall- or mast-mounted. Prices range from well under a hundred to several hundred dollars.

The problem with directional antennas is that they are, well, directional — this may be useful in a particularly long, narrow terrace house where you need full-speed front-to-back coverage with minimal spillage into adjacent premises, or if you're trying to reach an outbuilding.

Directional antennas can also be used to link two access points over a long distance (up to 10km or so in ideal conditions) to bridge two LANs.

Unless the distance between access point and antenna is small (perhaps one to two metres), you may need to install an amplifier to compensate for the signal loss within the cable. Such an amplifier can also be used to extend the range.

Note that snoopers may use directional antennas to attempt to access your network from a safe distance.

USING MULTIPLE ACCESS POINTS

You're unlikely to need more than one access point in a typical single-storey home or small office, though you may run into problems with larger premises made from "difficult" materials.

If you have, or are prepared to install, a wired Ethernet, you can attach multiple access points to your LAN, positioning them to provide the wireless coverage you need.

An alternative is to use a pair of HomePlug adaptors, such as NetComm's NP210, to link the remote access point to the rest of the network via the power circuits. Be aware that the throughput (14MB/s nominal) is similar to 10Mbit Ethernet or 802.11b, but slower than 802.11g and 100Mbit Ethernet. Similar devices supporting the new 200MB/s HomePlug AV standard are expected in 2006.

If you do install multiple access points, remember that you would normally want exactly one DHCP server on your entire network, which may be in one of the access points, a wired router or a combination modem/router. This will ensure all devices are on the same subnet and can see each other (see *APC* January 2006, page 110). Remember, we're talking here about home and small office networks, not corporate installations with more complex routing.

WDS

WDS (Wireless Distribution System) allows two or more access points to communicate wirelessly, extending the area covered. While WDS has the benefit of simplicity, there are two drawbacks.

Firstly, communication between the access points eats into the bandwidth available. Secondly, there's no guarantee that WDS-capable devices from different vendors will work together. They may, but they may not — so try before you buy or stick to one brand. WDS is part of the 802.11 standards but is not covered by Wi-Fi certification.

It's likely that you'll need to configure mixed devices manually, as vendor-supplied

wizards or assistants normally assume homogenous hardware. If you are configuring, say, an Apple AirPort Base Station and AirPort Express, the assistant makes the job easy.

MIMO

Replacing your existing access point and adaptors with MIMO (Multiple Input Multiple Output) equivalents will provide a significant improvement in coverage, as they support multiple signal paths. Buffalo, D-Link, Linksys, NetGear and other suppliers also offer MIMO products. Since the technology is not yet standardised, you'll need to stick to a single vendor to obtain the benefits.

If you mix brands, performance is unlikely to be significantly better than 802.11g. When matching adaptors and access points are used, vendors typically claim eight-to-10 times the coverage of 802.11g networks.

CONCLUSION

We've looked at various things you can do to improve wireless coverage. Some cost no more than a few minutes of your time and a little effort — others are more expensive. So, unless you're trying to blanket a large area, start with the free approaches. **ETC**

NEXT MONTH

- Sharing the disk and printer attached to your computer is one thing, but connecting peripherals directly to the network has advantages that easily offset the extra cost. In the next issue, we'll look at some of the choices that are within the budget for most small networks.



Colour calibration basics

Patrick Kirsch explains how to get your pictures from camera to screen to print (and how to keep them looking the way you want them to).

SKILL LEVEL

- Beginner

REQUIREMENTS

- Photoshop (version 5 or later)

TIME TO COMPLETE

- One hour

INSIDE INFO

- International Color Consortium
<http://www.color.org/>



PATRICK KIRSCH

Patrick Kirsch, former designer of APC, has worked in digital media and design for more than 15 years. He has extensive experience on computers, ranging from animating on Amiga, to video post-production, print, Web and multimedia. Patrick is also a musician and a home cinema buff – just don't get him started on movies.

Your pictures look great on your camera's 2in display (and even better on your 19in LCD monitor). So why do they print all washed out and slightly pinkish on your colour photo printer, even with the best quality glossy paper?

The answer is calibration. Put simply, your computer needs to know the colour "personality" of your camera (or scanner), monitor and printer in order to accurately reproduce images with these devices.

Colour management in the imaging/printing industries is an exact science, practised by highly trained professionals using advanced software and hardware. Fortunately, many of those tools and techniques are now available to semi-pros and amateurs for little cost and just a small investment in time spent learning.

Colour profiling using ICC profiles has been built into Windows (since Windows 98SE) and Photoshop (since version 5). Many other image applications are now also ICM/ICC-aware. Your camera, scanner and printer most likely came with colour profiles that installed with the drivers or could be added later. Everything you need to produce perfect prints is right at your fingertips.

WHAT YOU SEE IS NOT WHAT YOU GET

Your monitor is the first issue to tackle if you want an effective colour management system. Hardware calibration tools, such as the ColorVision Spyder, take the guesswork out of monitor calibration. An optical sensor reads the screen (CRT or LCD) and creates a very accurate monitor profile. However, these cost upwards of \$300. If you have Photoshop 5 or later installed,

you will find a Control Panel applet called Adobe Gamma which allows you to subjectively calibrate your monitor. First, make sure the ambient light conditions are controllable and repeatable. If your monitor is located close to a window, the external light conditions will affect what you see, so reposition your monitor if you can. Interior light striking the screen directly will also affect colour balance. Fluorescent and incandescent lights have very different colour temperatures. Make sure you use the same light when calibrating as you do when working.

WIZARDRY

Start Adobe Gamma, located in the Control Panels folder or in the Program Files>Common Files>Adobe>Calibration folder on your hard drive.

Double-click Adobe Gamma > Step-by-step (Wizard) > Next. Then, click Load, find sRGB Color Space Profile.icm and open it. The description should read: sRGB IEC61966-2.1. Change it to something describing your monitor and the ambient conditions. The sRGB profile was developed by HP and Microsoft as a lowest common denominator monitor profile and, as such, has a fairly restricted colour range (also known as colour gamut). You will only be using it as a starting point. Click Next. This screen tells you to set your monitor's contrast to its highest. Only do this if you have a CRT monitor. On an LCD, try 50-60% contrast, then adjust the brightness until you can just distinguish between the two black squares shown. Next, under phosphor selection, choose EBU/ITU (unless you know for sure your monitor's actual phosphor values) then click Next.

① On the following screen, make sure that View Single Gamma Only is deselected and Gamma is set to Windows Default and 2.20. Now, adjust the sliders to achieve the same colour density in the centre and surrounding red, green and blue swatches. Allowing your eyes to go a little out of focus when doing this can sometimes help. Next, set your hardware white point to 6500°K (daylight), and on the next screen set the adjusted white point to Same as Hardware.

Finally, you can compare the before and after calibrations. There may be only a subtle difference, but it is important in the overall scheme of full system calibration. Click Finish, and save your profile with a descriptive name. At startup, Adobe Gamma Loader will activate this profile every time you reboot.

1

The gamma setting of your monitor defines how bright your midtones are. Establish the current gamma by adjusting the slider until the center box fades into the patterned frame.

☐ View Single Gamma Only

Now choose the desired gamma.

Gamma: Windows Default 2.20

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Totally audacious

In this month's digital audio Workshop, *Daniel Winter* shows you how to get beyond basic audio editing and unlock the potential of Audacity.

BONUS DVD SOFTWARE

- Audacity for Mac and Windows (see DVD Music Toolkit for files).

SKILL LEVEL

- Beginner

REQUIREMENTS

- Audacity

TIME TO COMPLETE

- Varies

INSIDE INFO

- Audacity
www.audacity.sourceforge.net
- Freeware VST plug-ins
www.mda-vst.com
- Nyquist
www.cs.cmu.edu/~rbd/doc/nyquist
- Audacity VST Enabler
<http://audacityteam.org/vst/>
- mda VST Plug-in Pack
<http://mda.smartelectronix.com/>



DANIEL WINTER

Daniel Winter is a freelance developer with a background in multimedia and audiovisual production. He has been developing interactive database applications for a decade and producing music for 15 years. With award-winning online applications under his belt, Daniel has also been writing for APC since 1999.

Many years in the making, the cross-platform freeware audio editor Audacity is a humble application with huge potential.

If you ever need to remove silence, change volume levels, split audio files or convert between formats, it's the only program you need.

Most Audacity users, however, perform these simple tasks without ever exploring the app's full potential. This is understandable, as getting to know Audacity can be hard work.

The keyboard shortcuts are not obvious, and there is no comprehensive guide available — only a basic help file.

Consequently, this month we'll address this need by unveiling ways to go beyond the basics and start using Audacity with style, speed and skill.

TRACKS AND MORE TRACKS

When opening multiple audio files in Audacity, the default behaviour is that each file will be opened in a separate window.

While it is possible to copy and paste between document windows as in any other application, it can be far more effective to combine audio segments from multiple files using the program's multitrack capabilities.

1 Rather than using the File > Open command, multitrack editing is enabled when you select Project > Import instead. This way, each file open for editing will appear as a row (or "track") running from left to right across the main window.

Once two or more audio files are lined-up within the workspace, it is much easier to manipulate them together. This is particularly the case if the plan is to chop-up

and rearrange multiple audio recordings into a new file.

Note that when in multitrack mode, Audacity will combine the playback of all the tracks when the play button is clicked.

If you need to isolate a track, the Solo button in the track settings panel on the left can be used to mute all the other tracks temporarily.

Similarly, the Mute button will disable the selected track while the others play back normally. In addition to working with multiple audio tracks, both mono and stereo, Audacity supports two other track types for storing label and time information.

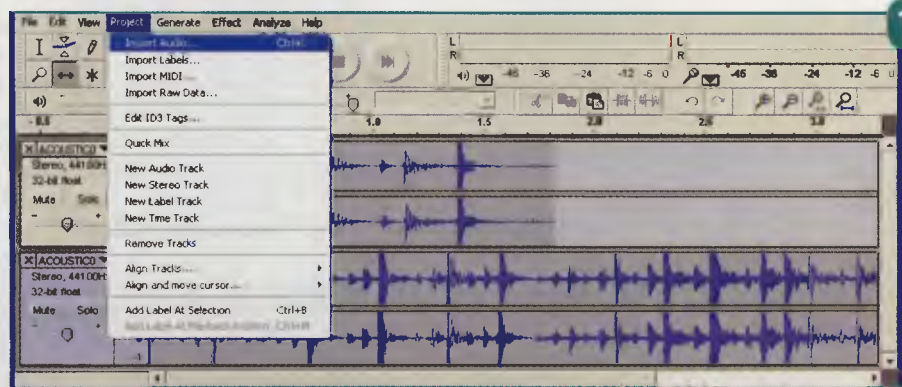
Label tracks are used to set marker points along the audio timeline, allowing you to store the locations of events with a named flag.

An example use of a label track is to specify the positions of song start and end points in a live recording. Time tracks, on the other hand, are used to change the playback speed of the project (more on this in a moment). To create a new track in Audacity, select the type of track you require under the Project > New menu.

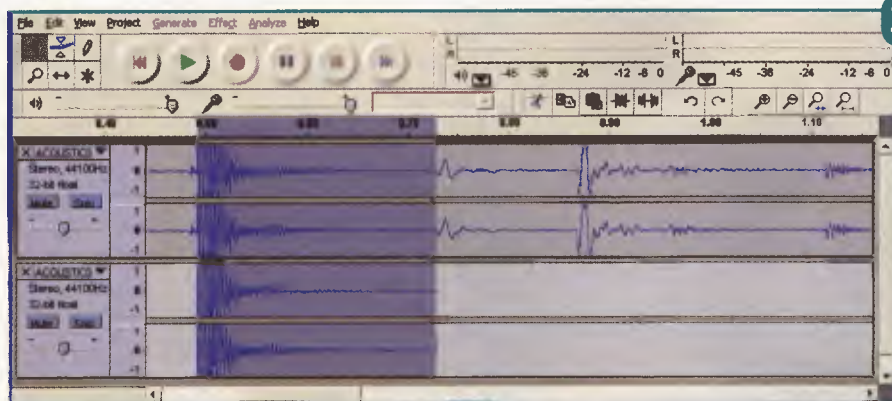
WORKING WITH SELECTIONS

The cursor tool is used to make selections by clicking in a track and dragging the mouse left or right until the desired audio is greyed-in. To preview the selection, click the play button and, if necessary, solo the track first. To modify the start or end point of a selection, hover the mouse pointer over either of its end-points.

When the cursor becomes a pointing hand, you can click-drag the edge of the selected region to reposition it. Using the space bar to play the selection, it is possible to very accurately trim the desired region. If you need to zoom in, use the mouse



The import command is used to open existing files into a new track in the current window.



The split and duplicate commands will move or copy the current selection to a new track.

TIP

- Use F1 - F6 to switch between editing tools.
- Drag an envelope point off the track's display window to delete it.
- Zoom in and out with the mouse wheel + Ctrl.
- Use L to loop playback of the current file or selection.

scroll-wheel while holding down the Control key.

Before copying or cutting the selected audio, however, always use the Find Zero Crossings function from the Edit menu. Using the hotkey Z for this with every edit will ensure that no undesirable clicks are accidentally introduced into the recording. If you plan to reuse a particular audio selection, it can be saved from the Edit menu using Selection Save and restored later with Selection Restore.

Alternatively, if it is only the cursor position you need to reuse, a marker can be set in a label track using Ctrl+B or selecting Add Label at Selection from the Project menu.

If a label is also required at the end of the selection, go to Edit > Move Cursor > To Selection End and hit Ctrl+B again. Note that whenever a label is created, Audacity expects a description to be entered. To leave a label blank simply hit the Enter key.

USING THE SPLIT AND DUPLICATE FUNCTIONS

While you can get by with copy, cut and paste commands, there are two more functions that will save much time when working in multitrack mode. The split function will cut the selected region and paste it into a new track beneath the current one. The duplicate function will copy the selection to a new track instead.

The beauty of both these commands is that they maintain the start and end points of the selection, making it easier to work with while maintaining its position in the timeline.

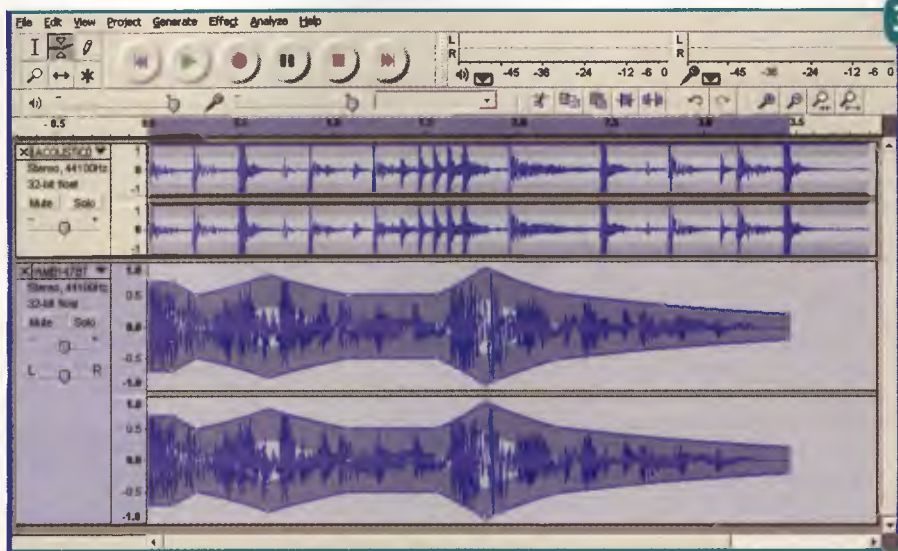
USING ENVELOPES

Audacity supports the use of non-destructive envelopes for manipulating the amplitude of a sound. Envelopes are defined by envelope points that specify a track's amplitude at a particular position in time.

Audacity automatically calculates the transition from one point to another, creating a smooth volume fade in the process. Because they are non-destructive, envelopes can be edited without affecting the original sound.

To create an envelope point, simply select the envelope tool and click within the wave form. Dragging a point up and down will modify the amplitude level, whereas dragging left and right will set the location of the point in time. Note also that an envelope point can be removed by dragging it away from the originating track.

Once an envelope has been created, you can preview the results using the space bar.



Non-destructive amplitude envelopes are used to change the volume of a sound without permanently modifying the source file.

2

If you want to edit the envelope points while listening to the results, select the audio in question and use the L key to loop playback while you make changes.

WORKING WITH TIME TRACKS

Time tracks are probably the most unusual feature of Audacity, being a function not found in any conventional audio editor.

Time tracks use an envelope similar to amplitude envelopes, except they determine the speed of playback at a given point in time. The end result of a time track envelope can be likened to changing the speed of a record player during playback.

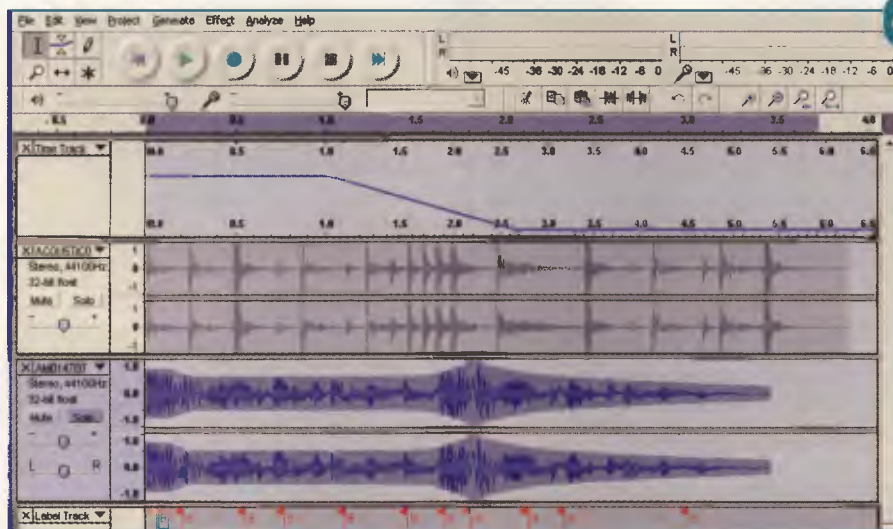
Theoretically, a time track could be used to generate DJ scratching techniques, although in reality the feature is not that flexible. Because the minimum and maximum playback rates do not allow extremely small or large values to be used, the most practical application of a time track is to correct small timing errors in the recording.

This means you can manipulate the swing groove of a drum track, for instance, or change the duration between any two events on the timeline without making permanent edits.

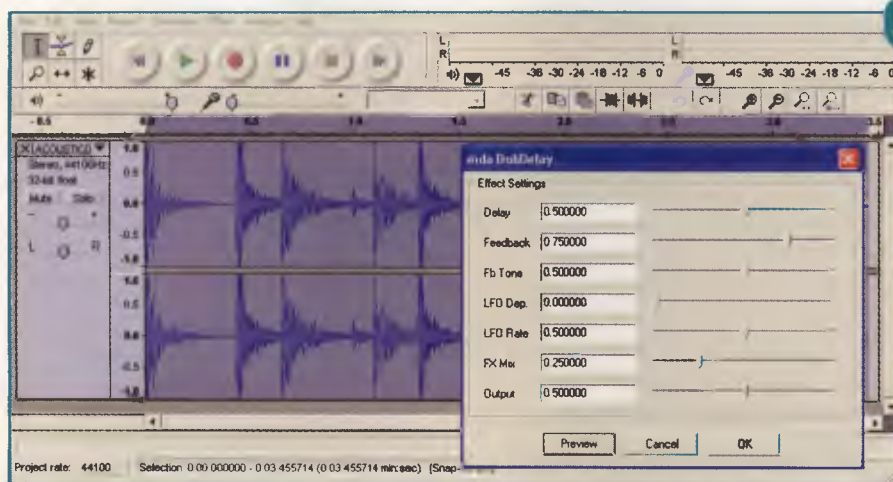
When an envelope point is placed on a time track, the track ruler updates to display the projected location of the playback head at that point. If you double the playback speed using a time track, for instance, you will hear the first 10 seconds of the recording in the first five seconds of playback.

Consequently, the time track ruler will show the 10-second mark directly under the five-second mark in the project time ruler. Because a time track will warp all the tracks

3



This time track is used to change the playback rate of the entire project.



VST plug-ins can be used with the help of the Audacity VST Enabler.

in the project, however, it is best configured for a single track in Solo mode. Once ready, it can then be exported to a separate WAV file. The exported file can be re-imported and the time track deleted.

SAVING PROJECTS

The Audacity workspace can be saved in a project file with the .aup file extension. Although Audacity projects cannot be used by other programs, they allow you to take a snapshot of all the current tracks, track settings and envelopes in a single file.

Without project files, you would need to reconstruct envelopes, labels and tracks whenever Audacity was reopened. As a rule of thumb, it is advisable to snapshot the current workspace into a new project file whenever destructive edits are about to be made. This includes mixing down (see right), cutting, deleting or using the split function.

While it is always possible to use Audacity's seemingly endless undo capabilities to go back to a previous edit decision, a project file can be reopened in another window if necessary.

Working this way, it is possible to import or paste the results into the current workspace without losing any subsequent changes.

SIMULTANEOUS RECORDING AND PLAYBACK WITH REAL-TIME MONITORING

To record a new track while listening to the existing project, enable the Play other tracks while recording a new one option in the Audio I/O Preferences.

Depending on the capabilities of your audio hardware, you may need to nudge the resulting recording forwards in the time line when you are done. This is because all sound cards have a latency that determines just how "real-time" its recordings can be. The latency of professional quality sound cards might be as low as 2ms or 3ms, which is virtually imperceptible.

Conversely, conventional sound cards can introduce a recording lag of as much as 500ms, making the result noticeably out of sync when played back.

A low-latency sound card can be used to monitor a recording as it is made by enabling the Software Playthrough option in the Audio I/O preferences as well.

THE PLUG-IN FRAMEWORK

Audacity supports plug-ins written in a programming language called Nyquist. Because Nyquist plug-ins are uncompiled text files, they can be written using Notepad or with another text editor. In fact, it is even possible to open a Nyquist editor window in Audacity and type commands directly into it.

Based on another language called Lisp, Nyquist is a straightforward language that has many built-in audio processing functions.

Although beyond the scope of this Workshop, there are good Nyquist resources online linked from the Audacity site.

For those tempted by the prospect of coding audio plug-ins, have a look at the Plug-Ins folder of the Audacity directory.

You will see that all the items under Audacity's Generate, Effect and Analyze menus are in fact Nyquist plug-ins.

USING VST PLUG-INS

In addition to Nyquist plug-ins, Audacity supports VST plug-ins. VST is a format designed by Steinberg for use with Cubase, although there are many other audio applications that support the format. To use VST plug-ins in Audacity, extract the VST Enabler plug-in to the Plug-Ins folder along with any VST DLL files you intend to use. The VST Enabler is free, but is distributed separately for licensing reasons.

To get started, a huge bundle of professional-grade freeware plug-ins are available from www.mda-vst.com/.

MIXING-DOWN

When you are finished with your Audacity project, the entire workspace can be mixed-down to a single audio file using the Quick Mix function in the Project menu.

This process will, however, destroy the project, leaving behind just a single stereo track. Consequently, it may be preferable to use the Export feature in the File menu instead.

It is possible to export WAV, MP3 or OGG formats and, if each track is to be rendered to a separate file, the Export Multiple option can be used. This is a great feature if you intend to rework the edited version in other applications. Unlike the case with Audacity project files, Export Multiple will render all the amplitude envelopes, time envelopes, silence regions and other effects into discrete files that can be used in any audio application. [BITE](#)

Solaris Hardware 101

So you're A-grade in apps — but you're flunking hardware. **Brendan Gregg** offers a crash course in configuring devices and drivers on Solaris 10.

SKILL LEVEL

- Advanced

REQUIREMENTS

- Solaris 10 (available on the APC July 2005 DVD, or from www.sun.com/software/solaris/get.jsp).

TIME TO COMPLETE

- 3 hours (approx)



BRENDAN GREGG

Brendan Gregg has been using Solaris for around a decade, working as a programmer, system administrator and consultant. He currently works as a contractor and sometimes teaches Solaris classes for Sun Microsystems. Brendan is involved with the OpenSolaris project and is the author of the DTraceToolkit.

INSIDE INFO

- Compatibility and device drivers
www.sun.com/bldadmin/hcl/data/sol
<http://solaris-x86.org/software/drivers>
www.sun.drydog.com/faq/8.html
www.bolthole.com/solaris/drivers
<http://docs.sun.com/app/docs/doc/817-5093>

Solaris 10 is more PC friendly than previous versions, with new applications and hardware support. In previous Workshops I've covered desktop applications — now let's take a look at configuring hardware and devices.

TERMINOLOGY

Devices may be referred to by different names. As an example, the first disk in a system may be referred to using the instance name: `cmdk0`. This contains the name of the device driver, the logical name: `c0d0s0`, which is a standard name. For this disk it reads controller 0, disk 0, slice 0; or the device path: `/devices/pci@0,0/pci-ide@1f,1/ide@0/cmdk@0,0:a`, which represents the device location on the motherboard. The logical names exist as symlinks under `/dev`. For disk devices look under `/dev/dsk`. These symlinks point to the device paths under `/devices`.

The following is a list of common terms Solaris uses. If you encounter a new term, try `man word` or `man -k word` to see what it means:

framebuffer	video card
slice	disk partition
sd	SCSI disk or CD-ROM
cmdk	a disk driver
rtls	a network driver
ehci	a USB nexus driver
module	device driver (can mean)

LISTING HARDWARE

- Several commands can be used to see what hardware Solaris has detected and is using.
 - `psrinfo -vp` lists the CPUs in your system, including their speed and manufacturer. Solaris 10 supports many CPU types, including AMD64s, and will use CPU enhancements like EM64T.

- `ifconfig -a` lists configured network interfaces, including their IP address and MAC address (if run as root). `lo0` is a virtual loopback interface. If no other interfaces are listed, force Solaris to initialise them using `ifconfig -a plumb`, then try `ifconfig -a` again. APC September 2005 (page 120) covers configuring network interfaces.

- `prtconf | grep -v not` lists the RAM detected by the system, then continues with a tree of system peripherals. The output is not easy to follow at first. Many of the names listed are device names such as `cmdk` and `sd`, or device node names such as `pci1186,1303`.

- `cat /etc/path_to_inst` lists device paths and associated driver names.

- `iodstat -E` lists errors for disk and CD-ROM devices (and lists details about these devices).

- `echo | format` lists available disks.

ADDING HARDWARE

To add a regular hardware device to Solaris:

- As root, run `touch /reconfigure`
- Shutdown using `init 6`
- Add the device
- Power on.

Use the listing hardware commands to see if the device was detected. The `touch /reconfigure` command ensures that its necessary device files are created under `/dev` and `/devices`. The `devfsadm -v` command can be run to repeat the device detection on a live system.

To add a USB device to Solaris, simply plug it in — it may work immediately. Try `tail -var/adm/messages` for messages, and you can try `devfsadm -v` if it has yet to detect. Support for USB storage devices is new. Try the following:

- Insert USB storage device
- `/etc/init.d/volmgmt stop`
- `/etc/init.d/volmgmt start`
- Run `df -h`.

If you are lucky, a new path will exist that is your storage device. After using it, run `eject -n` to discover its nickname and then `eject nickname`.

DEVICE DRIVERS

People often wrestle with their video cards: run the `kdmconfig` to configure your video settings. Adding a device driver often involves adding the driver file to `/kernel/drv`, then running an `add_drv` command to associate a device with its driver (eg. `add_drv -v -i pci1186,1303 rtls`). An `update_drv` command can be used to convince existing drivers that a device is compatible. These commands update `/etc/driver_aliases`, to associate the device name seen in `prtconf` with a driver name.

Finally, for estoeiric video and network cards, consider buying standard replacements. It may be easier to spend \$30 than to wrestle for hours to make a device driver work. [ETC](#)

```

1
Terminal
File Edit View Terminal Tabs Help
brendan:~$ vmstat 5
kthr  memory          page          disk          faults          cpu
r  b  w  swap free  re  mf  pi  po  fr  de  sr  cd  s0  --  --  in  sy  cs  us  sy  id
0  0  0 1065280 91572  3  9 10  0  0  0  0  1  0  0  0 269 145 231  1  1 98
2  0  0 976952 54892 48 2403 0  0  0  0  0  0  0  0  0 398 8306 1015 80 20  0
2  0  0 976956 54896 48 2377 0  0  0  0  0  0  0  0  0 381 8138 956 79 21  0
1  0  0 977228 55084 48 2386 0  0  0  0  0  0  0  0  0 390 8334 1003 80 20  0
2  0  0 976952 54892 62 2565 0  0  0  0  0  0  0  0  0 379 8490 990 79 21  0
2  0  0 976912 54780 45 2356 0  0  0  0  0  0  0  0  0 544 12189 1620 76 24  0
2  0  0 976920 54844 51 2376 0  0  0  0  0  5  0  0  0 439 8792 1130 80 20  0
1  0  0 977244 55080 48 2436 0  0  0  0  0  0  0  0  0 275 8418 911 81 19  0
2  0  0 976792 54832 46 2302 0  0  0  0  0  0  0  0  0 280 7927 869 81 19  0
2  0  0 976892 54644 51 2506 0  0  0  0  0  0  0  0  0 272 8548 913 80 20  0

```



DIY home theatre, part 4

If you've got two or more computers, you've just got to network them. In the final instalment of APC's HTPC series, *Patrick Kirsch* hooks up.

SKILL LEVEL

- Intermediate

REQUIREMENTS

- HTPC to act as server; 1GHz Pentium III PC (or similar) to act as client; network cards and cable; KnoppMyth install CD.

TIME TO COMPLETE

- 3 hours (approx)



PATRICK KIRSCH

Patrick Kirsch, former designer of APC, has worked in digital media and design for more than 15 years. He has extensive experience on computers, ranging from animating on Amiga, to video post-production, print, Web and multimedia. Patrick is also a musician and a home cinema buff — just don't get him started on movies.

Suppose you wanted to keep your power system in your study and use it for other purposes. You might like to create a remote PC and locate it in your lounge room to act as a media terminal. To keep the cost down, you could use a low-powered machine, say a 1GHz Pentium III with 256MB RAM, 20GB hard drive, built-in video and Ethernet. To reduce costs further, you could use a free distribution of Linux as your OS, along with free media-centre software. Fortunately, a ready-made solution already exists, called KnoppMyth. This is a rolled-up installer for Knoppix Linux (based on Debian) and MythTV media centre software (see www.mysettopbox.tv/knoppmyth.html). Then burn the ISO file to a CD — so you can boot your PC with it.

NUTS AND BOLTS

The hardware described above will allow you to playback standard-definition video (not HD) and music, and view images served from your power system across 100MB/s wired Ethernet. You could choose to install Wi-Fi networking, and will need about 10MB/s for DVD-quality video — theoretically possible with 802.11g (but an added strain on your wallet). A DVD-ROM drive would be a good idea, as playing a DVD across a network could be difficult and is likely to produce glitches and freezes. A SPDIF-equipped soundcard, like Sound Blaster Live!, will be needed for full Dolby Digital sound. You can dispense with a dedicated monitor and instead use your projector or HDTV to view the system. This will eliminate the need for a dual-head type video card — assuming your

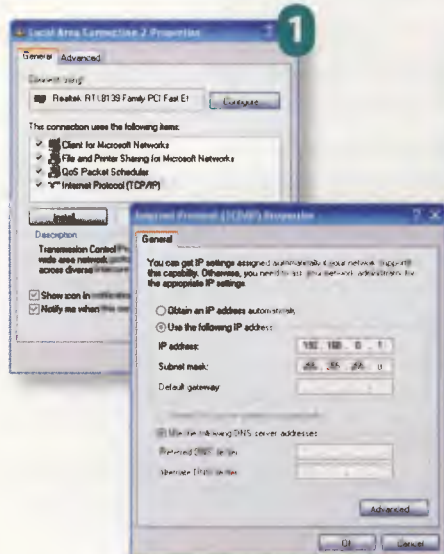
projector or TV will accept a 15-pin VGA connector. Finally, a wireless keyboard will make life a lot easier when controlling the media centre.

Using a low-powered PC in your lounge room means it should be very quiet. If it's an older machine, the power-supply fan may have become noisy and require replacement, as may the hard drive and the CPU fan. The video and Northbridge chips will most certainly be fanless. Watching live analog free-to-air TV on a machine like this should be possible with the addition of a TV tuner card. For this Workshop, however, the digital TV tuner already installed in your power-system will be used to time shift standard-definition programming for remote playback.

PRE-INSTALL

Before working on the KnoppMyth machine, you need to set up a few things on your Windows media server PC. If you are not conversant with Windows networking, you may need to do a bit of extra research.

First, you'll need a 100BaseT Ethernet port and a crossover CAT5 Ethernet cable long enough to reach your Linux box. 1 Make sure that File and Printer Sharing and Client for Microsoft Networks are enabled for the connection to the Linux machine under Control Panel > Network Connections > Local Area Connection > Properties. Double-click Internet Protocol (TCP/IP) and set your IP address and subnet mask to **192.168.0.1** and **255.255.255.0** respectively. Under Control Panel > System >



Computer Name, make sure you have a Workgroup name for your local network.

② Finally, enable your Video, Music and Picture folders to be shared.

Set up sharing of your Internet connection under Control Panel > Network Connections > your Internet connection > Properties > Advanced. Ensure that your firewall treats your internal network as trusted and will allow outgoing connections.

MAKE KNOPPIX AT HOME

Having put together your computer, set up the BIOS to boot from CD — insert the KnoppMyth CD you created earlier, and restart the machine. Press enter at the Boot: prompt, and after a few minutes of device detection, select Auto Install from the menu. OK both the dialog regarding time zones and the next screen as well.

Enter a username and password when prompted. Do not use MythTV — it's needed for other purposes. Next, set a root password. Make it a secure one and note it down somewhere (remember, Linux passwords are case-sensitive). Accept the default hostname, then review and OK your settings. Note the warnings: all data on your first hard drive (all partitions) will be lost. Cancel and back up now if need be. Partitioning and setup will take a few minutes, then you will be asked to reboot.

After rebooting, you will need to enter the root password to continue configuration. First, set up your time zone and verify the system date and time. Select Yes for Use DHCP Broadcast?, then select i686 modules (unless you are running a very old machine). After a few minutes, MythTV will start. Select Yes to delete settings on the following two screens and hit escape at the next. MythTV will restart in its normal operation mode after pre-scaling theme images. Escape and confirm exit to return to the KnoppMyth desktop.

Press Ctrl+Alt+F1. At the prompt, type **root** and Enter, then the root password. To verify your Internet sharing is working, type **apt-get update**. Linux will connect and update many of the installed packages on your system. If this doesn't work, review your Windows Internet sharing and firewall settings. Type **reboot** and Linux will restart. Again enter your root password, this time selecting No both times to the Delete Settings prompts, and Escape again. When MythTV restarts, exit it as you did earlier, then press Ctrl+Alt+F1 and log in as root again.

COMFORT ZONE

③ For those not completely familiar with the intricacies of Linux, KnoppMyth comes with a Web-based administration interface called Webmin. From the prompt, type **/usr/share/webmin/change-pass.pl /etc/webmin root rootpassword** and hit Return. Now type **nano /etc/webmin/miniserv.conf**. In the text editor that opens, find the line that reads Allow



127.0.0.1, and add the IP address of your Windows machine: **192.168.0.1**. Press Ctrl+O to save and Ctrl+X to exit. Now type **/etc/init.d/webmin start** to start Webmin, and **update -rc.d webmin defaults** to make Webmin start at every reboot.

On your Windows machine, enter the address **https://mythtv:10000** in a Web browser, where MythTV is the IP address of your KnoppMyth box (you can see this number during startup when Linux asks Windows for an IP address using DHCP). Log in as root, go to the server tab and click on Samba Windows File Sharing. Hit the Start Samba Servers button, then click Windows Networking. Set the Workgroup to the same one as you set in Windows earlier (all capital letters) and enter a server name of **mythtv**. Leave everything else as default and save. Click Restart Samba Servers. To ensure Samba also starts each reboot: on the Linux machine, at a prompt logged in as root, type **update-rc.d samba defaults**. In Windows Explorer, expand My Network Places to reveal your Workgroup. The MythTV host should appear there. Click on it and enter your username and password.

GOOD NEIGHBOURS

In order to let KnoppMyth see the shares on your Windows system, you will need to install extra software in Linux. Open an XTerm shell by

right-clicking on the KnoppMyth desktop and selecting Xshells > XTerm. Type **su** and then the root password. From the root prompt, type **apt-get update**. When that is done, type **apt-get install linneighborhood**. Finally, type **LinNeighborhood &** (case-sensitive). Hit Add, then enter the name of your Windows machine in the Name field and click Query. A list of all your Windows file and printer shares should appear in the main window. Right-click and select Mount on the Desired Shares in a mount point that you can remember easily. Then edit **/etc/fstab** with nano (as root) and add entries for each share as **//windowsservername/sharename /mountpoint smbfs username=windowsusername,password=windowspassword 0 0**. This will remount the shares each time you reboot. Now you can set up MythTV to use the mounted shares from your Windows machine for its music, video and picture locations. You can also access WebSheduler remotely from a Web browser with the URL **http://192.168.0.1:8429** (see APC December 2005, page 122) and schedule recordings on standard-definition channels for later viewing in MythTV. Like MediaPortal, also discussed last month (page 122), MythTV is a deep and rich application. Find out more at **http://knoppmythwiki.org** and **http://www.mythtv.org**.

UNIVERSAL ACCEPTANCE

Universal Plug and Play (UPnP) offers a new way to connect disparate devices on a TCP/IP network, and has become the basis of many network media players from manufacturers like D-Link and Zensonic. You can try out one of several UPnP media servers like Allegro (**www.allegrossoft.com/ams.html**) or TwonkyVision (**www.twonkyvision.de/UPnP**), which are standalone commercial servers.

There is also a UPnP server included in the Nero 6.6 suite called Nero MediaHome. On2Share (**www.on2share.com/UPnP**) is a free Windows Media Player plug-in that will make your WMP

library available to UPnP players on your network. Or you could try Microsoft's Windows Media Connect 2.0 server (**www.microsoft.com/windows/windowsmedia/devices/wmconnect/default.aspx**).

On the UPnP media-player side of the equation, there is precious little for Linux. However, the adventurous may like to look at djmount (**http://djmount.sourceforge.net**). This program will mount the UPnP device as a file system that can be accessed by MythTV or any other media player, such as VideoLAN Client (**www.videolan.org/vlc**).



Kick-starting ASP.NET 2.0

Microsoft's new .NET framework 2.0 makes it easier than ever before to produce high-quality, secure and scalable Web apps. *David Williams* shows you how.

SKILL LEVEL

- Beginner

REQUIREMENTS

- Visual Studio.NET 2005 or Visual Web Developer Express Edition; SQL Server or SQL Server Express

TIME TO COMPLETE

- 1 hour

INSIDE INFO

- www.asp.net/
- www.4guysfromrolla.com/



DAVID WILLIAMS

David Williams is a Newcastle-based IT consultant specialising in software architecture and infrastructure design. In the past he's worked as a University lecturer, an international troubleshooter for a call centre company and an IT manager. David firmly believes the only limit to technological achievement is that which we can conceive.

The second incarnation of the .NET framework offers rich new functionality that speeds the development time in building data-driven Web sites. Many new controls don't even need programming and can be exploited to full effect by Web designers of all experience levels.

NO WEB SERVER REQUIRED

Previous versions required Microsoft's Internet Information Server (IIS) to be installed in order to develop Web applications. While Visual Studio 2005 (and ASP.NET 2.0) still supports IIS, developers have a new file system option that allows applications to be created anywhere on disk. Visual Studio launches its own built-in Web server when the Web app is run. This is very useful but only for development: to be used by others, an app must still be deployed to a conventional Web server.

By default, Windows XP does not install IIS. To use it, open the Add/Remove Programs Control Panel and Add/Remove Windows Components. Check the IIS box to install it. If Visual Studio is installed before IIS, then ASP.NET will not be associated with IIS and ASP.NET 2.0 applications can't be run. This is easily rectified by using the aspnet_regiis utility in C:\Windows\Microsoft.NET\Framework\v2.0.50727, with the -i option like this:

```
aspnet_regiis -i
```

CREATING NEW WEB PROJECTS

Creating new Web applications has changed in Visual Studio 2005. Use the File/New Web site command. Several Web site templates are presented. To explore new features in ASP.NET 2.0, choose the Personal Web Site Starter Kit. When the template is selected, the Location and Language options become active. Choose the file system location and pick a preferred language (Visual Basic, Visual C# or Visual J#). Click OK to continue. ❶

Visual Studio will create a beginning Web site on disk, and open a welcome page in the IDE.

The files making up the site are listed in the solution explorer along the right-hand side. The site is designed to allow people to show photo galleries to friends and family. Logins can be granted so photos can be added or removed. ❷

CONNECT THE DATABASE

The starter kit is data-driven and uses two databases. One is the personal database used by the Web site to store photos. The other is a central aspnetdb database used by ASP.NET 2.0's new personalisation features.

❸ If SQL Server Express is installed, the application can be run directly by pressing Ctrl+F5. This will launch the built-in Web server. If all is well, the start page will be shown. Otherwise an error message will be displayed, complaining that a connection cannot be established to the database server.

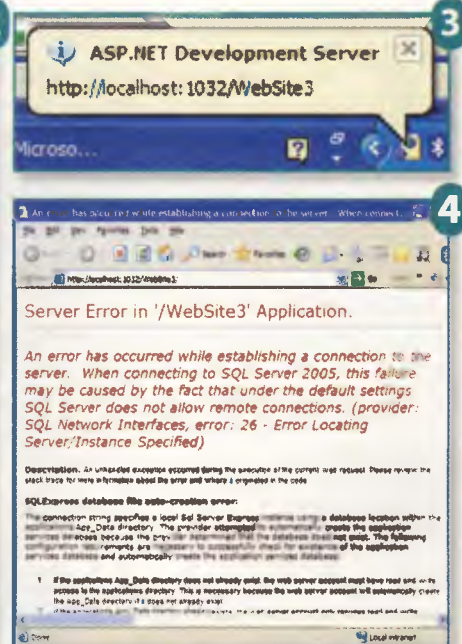
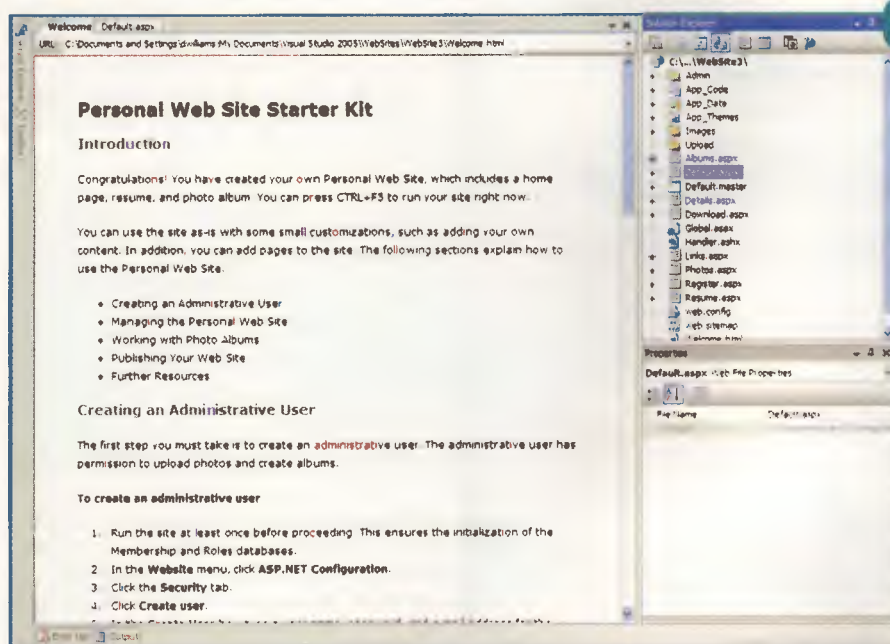
❹ This is easily solved. Firstly, the aspnetdb database must be established. Again, this is created by a command in the C:\Windows\Microsoft.NET\Framework\v2.0.50727 directory, this time aspnet_regsql. Execute that command and a wizard will lead you through the steps to create a database specifically for ASP.NET 2.0 to store its application management data. This permits specifying which database server to use, and the name of the database. The default name is aspnetdb, but this may be changed. ❺

Secondly, the application-specific database must be created. If using SQL Server 2005, open the Microsoft SQL server Management Studio. If using a previous version of SQL Server, open the Query Analyzer. Connect to the desired database server.

Back in the Visual Studio IDE, expand the App_Data directory listed in the solution explorer. A file called personal-add.sql has been supplied there, and this contains all the SQL code necessary to create the database. Double-click the file to open it in the IDE, click into the IDE window, press CTRL+A to select all the text, then CTRL+C to copy. Click back into the Query Analyzer, press CTRL+V to paste the SQL instructions, then F5 to execute them. The Query Analyzer will report the commands have been executed successfully. It is now safe to close Query Analyzer.

Although the two databases now exist, the application is still configured to use SQL Server Express and will not yet run. Double-click on the web.config file within the solution explorer. Find the lines which define the database connection strings like so:





```
<connectionStrings>
```

```
<add name="Personal"
connectionString="Data Source=.\
SQLExpress;Integrated Security=True;User Inst
ance=True;AttachDBFilename=|DataDirectory|
Personal.mdf" providerName="System.Data.
SqlClient" />
```

```
<remove name="LocalSqlServer"/>
```

```
<add name="LocalSqlServer"
connectionString="Data Source=.\
SQLExpress;Integrated Security=True;User Inst
ance=True;AttachDBFilename=|DataDirectory|
aspnetdb.mdf" />
```

```
</connectionStrings>
```

The program uses these connection strings when it needs to access data. Presently, they define connections to SQL Server Express. To make the app work with the two SQL Server databases created above, you need only change these connection strings. The new values are:

```
<connectionStrings>
```

```
<add name="Personal" connectionString="S
erver=localhost;Database=Personal;Trusted_
Connection=True" providerName="System.
Data.SqlClient" />
```

```
<remove name="LocalSqlServer"/>
```

```
<add name="LocalSqlServer" connectionStri
ng="Server=localhost;Database=aspnetdb;Tr
usted_Connection=True" />
```

```
</connectionStrings>
```

Press Ctrl+F5 again and the application should display correctly, with a login prompt, some gibberish text, and a menu of links along the top.

CREATING LOGINS

Every substantial ASP.NET application requires users to log in. ASP.NET 2.0's new login management facilities simplify this greatly.

7 On the front page of the sample app is a login box. So far, there are no accounts and no way of logging in. Close the Web browser and return to Visual Studio. Click the Website/ASP.NET Configuration menu. This opens a Web site supplied by ASP.NET 2.0 to manage all the new application services provided.

Click Security to add usernames and passwords, and to create roles and allocate users to them. Create one user to begin with, and ensure they are in a role called Administrators. Close the Web browser, hence the ASP.NET Web application administration site, when this is done. If Visual Studio displays an error that the web.config file has been modified outside the source editor, click "Yes" to reload the file using the changes made by the ASP.NET Web application administration site. Press Ctrl+F5 to run the Web app again. It will be possible to log in using the username and password just defined. Close the browser and return to the IDE. Open the Default.aspx page and open the source view. Near the top, a new ASP.NET 2.0 loginview control is defined. It has this structure:

```
<asp:loginview id="LoginArea"
runat="server">
```

```
<AnonymousTemplate>
```

```
<asp:login id="Login1" runat="server">
```

```
<layouttemplate>
```

```
<!-- code here -->
```

```
</layouttemplate>
```

```
</asp:login>
```

```
</anonymoustemplate>
```

```
<LoggedInTemplate>
```

```
<!-- code here -->
```

```
</LoggedInTemplate>
```

```
</asp:loginview>
```

These tags define two separate displays. ASP.NET 2.0 manages which one is displayed at any time. Within the loginview opening and closing tags are two templates. One is called AnonymousTemplate. It displays when ASP.NET 2.0 doesn't know the user (not logged in). The second is LoggedInTemplate which displays when ASP.NET 2.0 knows the user (logged in).

Within the AnonymousTemplate, it is appropriate to create username and password fields and a login button. When the button is clicked, ASP.NET 2.0 will compare the credentials with those in the application's global aspnetdb database and report back that the login succeeded or failed. If login succeeded, the page redisplayed using the LoggedInTemplate.

In the sample app, the user's login name is displayed on each page. This bit of magic happens with a simple tag called loginname, which is used in the LoggedInTemplate:

```
<LoggedInTemplate>
```

```
<h4><asp:loginname id="LoginName1"
runat="server" formatstring="Welcome {0}!"
/></h4>
```

```
</LoggedInTemplate>
```

The login name uses a format string to control what is displayed. The special text {0} is substituted for the username.



Welcome to the ASP.NET SQL Server Setup Wizard

This wizard creates or configures a SQL Server database that stores information for ASP.NET applications services (membership, profiles, role management, personalization and SQL Web event provider).

To configure the database for these features individually or for additional features such as session state or SQL cache dependency, run `aspnet_regsql` at the command line. For help with command line options, use the `/?` switch.

Click Next to continue

YOUR NAME HERE

HOME RESUME LINKS ALBUMS REGISTER

My Personal Site

HOME | LOGIN

Login to Site

User Name

Password

☐ Remember me next time

[login](#)

or

[create account](#)

My Latest Piece of Work

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod.

Welcome to My Site

This is my personal site. In it you will find lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod tincidunt ut laoreet dolore magna aliquam erat volutpat. Ut wisi enim ad minim veniam.

What's New

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod.

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod.

Cool Links

- Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod.
- Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod.
- Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod.
- Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod.

5 is to be changed, modify the master page and the changes will flow through the entire site. The sample Web site uses a master page, called `Default.master`. Open that file in the IDE and its structure is revealed:

```
<%@ Master Language="C#"
CodeFile="Default.master.cs"
Inherits="Default_master" %>

<html>

<!-- code here -->

<asp:contentplaceholder id="Main"
runat="server" />

<!-- code here -->

</html>
```

The master page can have as much HTML and as many ASP.NET 2.0 constructs as desired. Wherever custom page content appears, a `contentplaceholder` tag is used. This instructs ASP.NET 2.0 to insert page-specific details there. To see this, open `default.aspx`. It does not contain any opening or closing HTML tags. It simply begins by specifying its `MasterPageFile` and declaring content, using the same name as the `contentplaceholder` above:

```
<%@ Page Language="C#"
MasterPageFile="~/Default.master"
CodeFile="Default.aspx.cs"
Inherits="Default_aspx" %>

<asp:content id="Content1" contentplaceholderid="Main" runat="server">

<!-- code here -->

</asp:content>
```

The master page's `contentplaceholder` is substituted for everything between the content open and close tags. A master page can have more than one `contentplaceholder`. It can even use another master page as its master, enabling more customised pages: ie. for sections within a site. However, pages using the second master are only editable in source mode within the IDE; the IDE cannot show the design of pages with multiple master pages.

SITEMAPS

Each page in the Web app displays a list of links to other pages. Previously, the links had to be entered into every single page. If new pages were added, every page needed editing. Even if the list of pages came from a database, the code to retrieve the list and render it had to exist in each page.

ASP.NET 2.0 offers new sitemap handling to do all this on behalf of the developer. The key is a simple XML file and a handful of controls. Open the `web.sitemap` file in the solution explorer. It contains the site's menu structure as a series of nodes:

USING WINDOWS AUTHENTICATION

A big issue for corporate intranets is "single sign-on" which allows a staff member to log in, then access all necessary systems with the same credentials. If a Web app has its own usernames and passwords, as this app does at present, it is one more thing for users to remember and another set of credentials administrators have to create and remove when staff come and go. A better option is to use Windows authentication. This means that if the user is logged in to the company network, the app picks up their details automatically. This doesn't prevent users accessing the site from outside the company network; ie. over the Internet. Users can still be given a login prompt, then enter their Windows username and password to proceed.

This is easily achieved with two steps. Open `web.config` in the IDE. Find the lines that specify the authentication mode as below:

```
<authentication mode="Forms">
  <forms loginUrl="Default.aspx"
  protection="Validation" timeout="300" />
</authentication>
```

Delete these lines, or change the mode from Forms to Windows. Either has the right effect;

the app no longer uses the `aspnetdb` list of users. Run the app again using `Ctrl+F5`. This time it will not even display the login prompt; it will show the currently logged in Windows username immediately. This works for Windows users but it doesn't force Internet users to log in. A second step fixes this, though it applies to IIS only. Since the Visual Studio built-in Web server only exists for the lifetime of an individual application session, it is not modifiable.

Open Internet Information Services within Administrative Tools. Expand the computer's name and Web sites. Right-click on the default Web site and select Properties. Click Directory Security, then Edit. Uncheck anonymous access and ensure Integrated Windows authentication is checked. Click OK and OK again. Now the Web site will not permit unauthenticated users. Internet users will now be prompted to enter a valid Windows username and password to continue.

MASTER PAGES

A major enhancement of ASP.NET 2.0, which many will consider its best new feature, is the introduction of master pages. A master page is a page layout which can then be applied to any or all child pages. It helps enforce a consistent look-and-feel throughout the entire site. If the design

```
<siteMap>
  <siteMapNode title="Home" url="Default.aspx">
    <siteMapNode title="Resume"
      url="Resume.aspx" />
    <siteMapNode title="Links" url="Links.aspx" />
    <siteMapNode title="Albums"
      url="Albums.aspx" />
    <siteMapNode title="Photos"
      url="Photos.aspx" />
    <siteMapNode title="Details"
      url="Details.aspx" />
  </siteMapNode>
</siteMapNode>
<siteMapNode title="Register"
  url="Admin/Registers.aspx" />
<siteMapNode title="Manage"
  url="Admin/Albums.aspx" />
<siteMapNode title="Photos" url="Admin/Photos.aspx" />
<siteMapNode title="Details"
  url="Admin/Details.aspx" />
</siteMapNode>
</siteMapNode>
</siteMapNode>
</siteMap>
```

Every siteMapNode declares a link title and a URL. Inspect the file called Default.master to see how this XML data can be used. There are two new ASP.NET 2.0 controls here. A sitemapdatasource creates a connection to the XML data. The control expects the unlisted filename to be called web.sitemap.

```
<asp:sitemapdatasource
  id="SiteMapDataSource1" runat="server"
  startingnodeoffset="0" />
```

A menu using this data source is the second control. Modifiers include a Cascading Style Sheet and an option for sub-page drop-downs.

```
<asp:menu id="menua" runat="server"
  datasourceid="SiteMapDataSource1"
  cssclass="menua"
  orientation="Horizontal"
  maximumdynamicdisplaylevels="0"
  skiplinktext=""
  staticdisplaylevels="2" />
```

This menu appears the same on every page. A control used in the master page displays an expanding and shrinking path, much like the links showing ever-deepening category levels in Yahoo's search engine. Called SiteMapPath, it uses the same datasource as below:

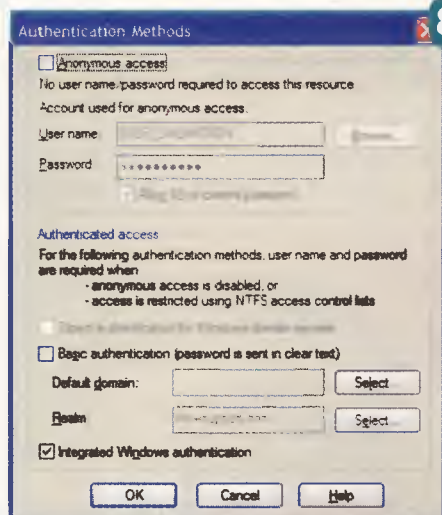
```
<asp:SiteMapPath id="SiteMapPath1"
  runat="Server" PathSeparator=" > " RenderC
  urrentNodeAsLink="true" />
```

These controls show both a menu and a site path in each and every page the user visits.

ACCESS CONTROL

The sample application lets you create and maintain photo albums for others to see. Yet there are certain essential administrative functions — all within the Admin subdirectory — which should have their access limited. Controlling access to these pages is easily done. Back in web.config, the directory is restricted to users within the Administrators group:

```
<location path="Admin">
  <system.web>
    <authorization>
      <allow roles="Administrators"/>
      <deny users="*/"/>
    </authorization>
  </system.web>
</location>
```



This configuration block prevents users without the Administrator's role from accessing the directory.

If using forms-based security (the default option), this role was created earlier within the ASP.NET 2.0 web application administration site. If using Windows security, this role is the name of a security group created within either the local computer management or Active Directory.

No additional code is needed to stop non-administrator users opening pages within the Admin subdirectory: the above settings will block access and they'll get an error message if they try.

However, if the non-administrator users don't even know there is an Admin subdirectory, why show them an error message? Happily, the sitemap controls cater for this. Back in the default.master page, the menu control has a modifier which says:

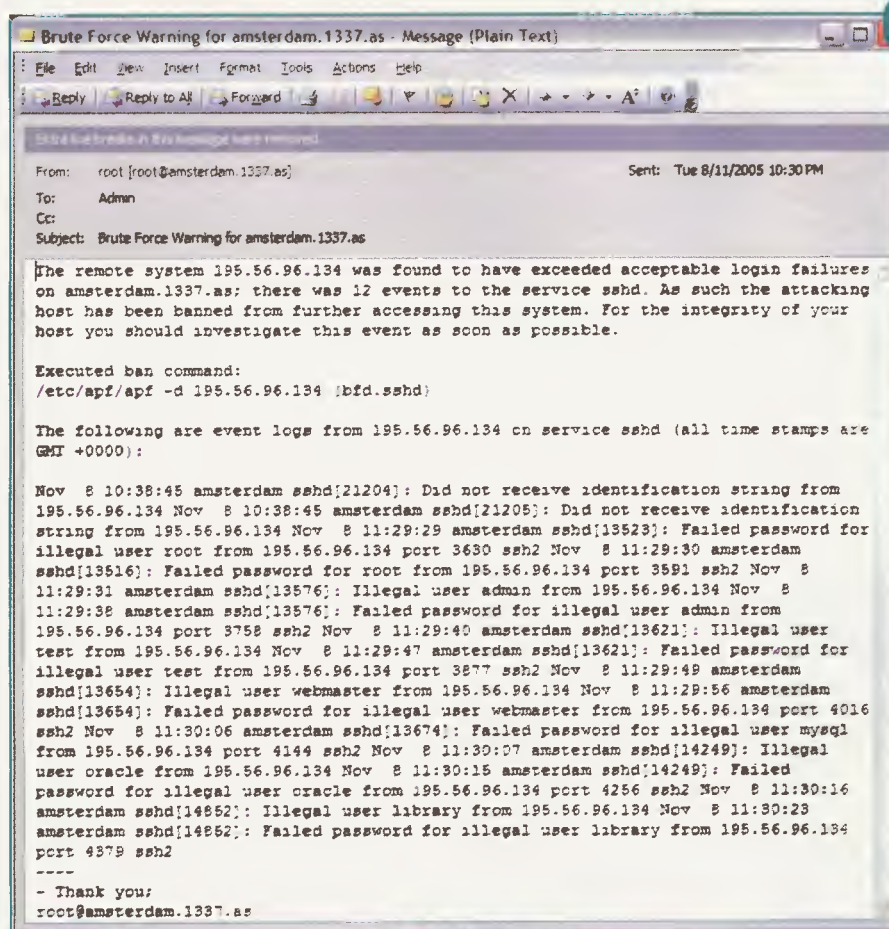
```
skiplinktext=""
```

If this modifier doesn't exist, all the links within the sitemap are displayed — whether the user has access or not. When the modifier is defined, links the user cannot access are not displayed. Their names are substituted for the text specified. If the text is the empty string, as above, the option doesn't display, and there's no hint to the user they are missing something.



WHERE TO FROM HERE

This workshop has covered a variety of new ASP.NET 2.0 features using a sample Web site provided within the IDE. In all this time not one single line of Visual Basic or C# or J# has been written. Everything has been performed entirely with ASP.NET tags. It not only cuts down programming time, but makes it easier than ever before for web designers (and others who aren't coders) to make sophisticated, secure and robust web apps. [\[1\]](#) [\[2\]](#) [\[3\]](#)



Instant notification: the Brute Force Detection extension to APF provides proactive blocking of hacking attempts on your Linux system.

```
/root/apf/apf-0.9.6-1/install.sh
```

```
service apf start
```

① By default, APF will block all inbound access attempts to your system bar SSH (which runs on port 22). Egress filtering is disabled, allowing you to establish any outbound connection from your system. This default configuration offers a reasonable level of protection and, depending on the services you have running on your Linux box, you may have to edit this configuration.

To make such changes, edit the `/etc/apf/conf.apf` file. This file lists all of the configuration options for APF as well as detailed descriptions of what each setting does.

If you're testing firewall rulesets from a remote system, ensure that you enable development mode while testing. This mode ensures against implementing a ruleset that blocks your access to the system. If you mistakenly enable such a ruleset, the firewall is disabled after five minutes, restoring your access in the process.

APF runs as a service on Fedora, CentOS and Red Hat Linux distributions. To start the firewall, type:

By default, the firewall will not load up on boot. Once you've created a configuration you're happy with (and have tested it thoroughly), the following commands will set your system to start APF on system boot:

```
chkconfig --add apf
chkconfig --level 345 apf on
```

② Once you have APF installed and running, take a look at the Brute Force Detection add-on to APF (www.r-fx.ca/bfd.php). ③ This add-on is especially handy if your system is directly connected to the Internet, as it will dynamically block most brute-force access attempts to your system (BFD running on one of my servers detects on average six different brute-force hacking attempts daily, and dramatically reduces the length and risk of each attack).

ADVANCED FILE PERMISSIONS

Way back in part three (APC February 2005, page 98), we covered the basics of file system

permissions and how to change the owner and group of files. However, there are a few other permissions settings available for use.

Files can be marked as Set User ID (SUID) executables or Set Group ID (SGID) executables. Both markings achieve similar results — when a file is executed by a user who has executable permissions, it is granted access to system resources as if it was run by the owner user or owner group of the file.

You can tell a file has been marked as SUID or SGID executables by looking at the execute character in a file's user or group field respectively. A regular executable will contain the letter "x" in this field, while an SUID or SGID executable will contain an "s".

④ Sticky-bits are also assigned to directories.

When assigned, all users are allowed to write files to the directory (or create subdirectories), but they are only permitted to modify or delete files they have previously created or files that they own. A sticky-bit enabled directory will have the letter "t" appearing in the execute character of a directory's everyone field.

Much like regular permissions settings, these advanced settings can also be assigned using the `chmod` command. To set these permissions, you need to supply numeric arguments to `chmod`, adding an extra digit at the beginning of the permissions code. Binary arithmetic is used to set this extra digit properly, according to the following table:

Value	Meaning
4	Assigns the SUID property to a file
2	Assigns the SGID property to a file
1	Assigns the sticky-bit to a directory

For example, to make a file both SUID and SGID executable for all users, one would enter:

```
chmod 6755 <filename>
```

where `<filename>` is the name of the file that we are applying these permissions to. The above example will also set the regular permissions on the file so that the owner can edit the file, but others can only read and execute it. To preserve the existing basic permissions, you would use the `+` sign to add the advanced permissions as follows:

```
chmod +6000 <filename>
```

These advanced permissions can also be removed by simply replacing the `+` sign with a `-` sign. From a security perspective, it's important that you assign SUID and SGID properties with extreme caution. When enabled, both properties allow users to



transcend the restrictions placed by their current account settings.

By the same token, you should be wary of any files that are not located in bin directories (ie. /sbin, /usr/bin and /usr/sbin) that have these permissions set. The presence of such files could indicate the presence of a rootkit or trojan installed on your Linux system. The following two commands will generate a list of all SUID and SGID files on your system:

```
find / -perm +2000
find / -perm +4000
```

PROTECTING THE ROOT ACCOUNT

The root account has permission to do anything on a Linux system. If an unauthorised user

managed to get root access to your system, they could erase your entire system if they chose to do so. Actually, they'd be more likely to install malicious software and hide that software with a rootkit, which is probably even worse than erasing the entire file system.

As such, you need to protect the root account in as many ways as possible, while still providing yourself with the ability to perform root-user functions.

One of the first things that you can do is to disable direct root logins via SSH. This is even more important if your Linux machine is directly connected to the Internet (and acting as a Web server, for instance).

To do so, edit your /etc/ssh/sshd_config file in the editor of your choice. Uncomment the PermitRootLogin line and ensure that this

directive is followed by a single space and the word "no". While you're at it, uncomment the Protocol line, and ensure that this directive is followed by a space and the number 2. This forces you to use SSH 2 to connect to the server, a more secure update to the original SSH specification. Save your changes, exit from your editor and then restart your SSH daemon:

```
service sshd restart
```

In order to gain access to the root account via SSH, users will now need to log on to the system as a regular user and then execute the **su** command. This forces them to enter two passwords instead of just one.

The next thing you can do is restrict access to the su command. You do this by enabling a special group called "wheel" and ensuring that the su command can only be run by members of the wheel group.

Adding users to the wheel group is simply done by using the **gpasswd** command (see part 12 — APC November 2005, page 112):

```
gpasswd -a <user> wheel
```

where <user> is the name of the user account that you want added to the wheel group. Step two is done by using the **chown** command to ensure that members of the wheel group have access to the su command:

```
chown root:wheel /bin/su
```

Next, the su command needs to have the correct permissions assigned to it so that members of the wheel group (and only members of this group) can execute it (using the advanced permissions techniques mentioned previously):

```
chmod 4750 /bin/su
```

Denied! Once BFD blocks an attack, the IP address that initiated the attack is listed in /etc/apf/deny_hosts.rules. APF blocks all communication with these IP addresses.

SUID and sticky-bits: /var/tmp is an example of a directory that usually has the sticky-bit enabled. The su command is one of a few files that should always be SUID-executable.

3

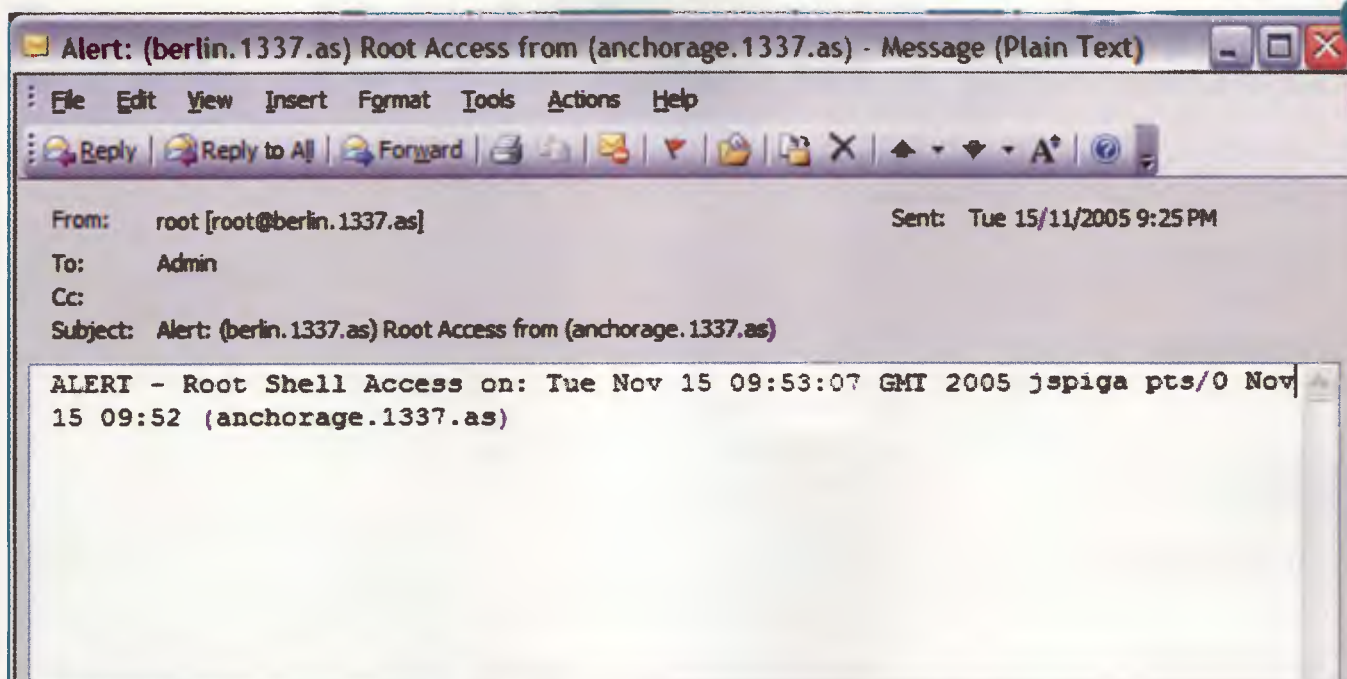
4

The su command now has the following permissions:

```
-rwsr-xr-x root wheel
```

In a nutshell, this means that members of the wheel group can execute the command, but root privileges are used to execute it. No other groups can even read the command and the root user is the only one who can make modifications to the file.

The last protection mechanism that will be listed here is to enable an email alert to be sent each time someone logs in as the root user. To do this, edit the /root/.bash_profile file, and add the following line to the bottom of the file:



```
echo 'ALERT - Root Shell Access on: `date`
`who` | mail -s "Alert: Root Access from `who`
awk '{print $6}'" <email>
```

where <email> is the email address that you would like the email alert to be sent to. It's a good idea to get this email sent to an external email account (that is, an email account not on the system in question). That way, a malicious user cannot delete the system-generated email before you read it.

SETTING LOGIN TIMEOUTS

If your Linux system has multiple people using it at various times, it might be worthwhile implementing login timeouts on your system. With this enabled, any session that has been idle for longer than a defined period of time will be automatically logged out. This setting only applies to command shells — GUI users can still remain logged in to the system.

Each of the scripts that are located in the /etc/profile.d directory are executed each time any user logs on to the shell. Therefore, by adding a simple script that sets the timeout to this directory, the timeout will apply to everyone who logs on to the system:

```
vi /etc/profile.d/timeout.sh
```

All that this script needs to do is set the **TMOUT** variable as follows:

```
TMOUT=<time>
```

where <time> is the number of seconds that you wish to set the timeout to. In general, a value of 1800 (30 minutes) is a fairly generous timeout, but you may wish to change this value depending on your circumstances.

After creating the file, you should ensure that it is able to be executed by all users:

```
chmod ugo+x /etc/profile.d/timeout.sh
```

One last caveat about this script is that it will only be executed if users are using the bash shell. The other popular shell of choice is the C shell (csh, and its variants). A second profile.d script can take care of users using this shell:

```
vi /etc/profile.d/timeout.csh
```

The format of the timeout command is slightly different for this shell:

```
set autologout=<time>
```

where <time> is the login timeout in minutes. Again, you'll need to make sure that the script you've created is executable by all users:

```
chmod ugo+x /etc/profile.d/timeout.csh
```

RESTRICTING SHELLS

It's not possible to set login timeouts on most other shells. If you'd prefer to restrict the users of the system from being able to access other shells which may be installed on your Linux system,

Who's using root? This email notification tells me that I've just used the su command to login as the root user on a server.

edit the /etc/shells file. To prevent access to a shell, simply place a # in front the shell's command path to comment out the line.

OTHER SECURITY TIPS

These items are just the tip of the iceberg when it comes to Linux security. Some other things to consider in order to harden up your box are to:

- Disable Telnet from within xinetd (www.phy.bnl.gov/cybersecurity/telnet.html).
- Install an intrusion detection service such as Tripwire (www.tripwire.com/).
- Install and periodically run rootkit detection applications such as chkrootkit (www.chkrootkit.org) and rkhunter (www.rootkit.nl/).
- Mask service names and version numbers on various system services (especially PHP, Apache, MySQL, FTP and SMTP services).
- And finally, educate users on having strong and secure passwords. [ETTC](#)

INSIDE INFO

- APF (Advanced Policy Firewall) www.r-fx.ca/apf.php

NEXT MONTH

- In next month's Mastering Linux Workshop, we'll explore network file systems and Samba. At the end of this guide, you'll be able to share files more easily between Linux and Windows systems.



Mastering PHP and MySQL, part 5

In the last part in this series, *Lucas Hale* shows you how to build a database driven Web application using PHP and MySQL.

SKILL LEVEL

- Beginner

REQUIREMENTS

- MySQL database running on Windows; Web server with PHP installed and configured; PHPMyAdmin installed on server; Web browser.

TIME TO COMPLETE

- 1 hour

IN THIS SERIES

- **Part 3 – December '05**
Improving the database.
- **Part 4 – January '06**
Multiple tables.
- **Part 5 – February '06**
Building database relations.



**LUCAS
HALE**

For the last six years, Lucas has been working as a professional software developer for an Australian company specialising in Visual C++ and C for real time control systems on Microsoft Windows with hard, real time kernel extensions. He's also worked with technologies such as PHP, Java, Apache and VoIP, and created custom USB devices. At home, he is currently building the ultimate HTPC.

A single table isn't the most efficient database design for a set of information such as DVD movies where much of the information comes from a common set of data. This time we learn how to make your database relational.

BREAKING THE DATA APART

The first step is to decide which information to take out of the main table and make into a table of its own. Movie classification is a good choice as it's a limited set that's repeated for each movie. There are currently six movie classifications (Office of Film and Literature Classification (<http://www.oflc.gov.au>).

Add a new field to the movies table called `classification_id`.

Next create a new table called `classifications` with three fields, `classification_id`, `classification`, and `classification_colour`. The colour is going to be used for display purposes and has really only been added to show what can be done with the data once it is in its own table.

1 Add the classifications you want to use for your movies, G, M, MA15+, R18+, etc. and add their corresponding colours. This is now the `classification` table.

```
CREATE TABLE `classifications` (
  `classification_id` int(4) unsigned zerofill NOT NULL auto_increment,
  `classification` varchar(20) NOT NULL default '',
  `classification_colour` varchar(20) NOT NULL default '',
  PRIMARY KEY (`classification_id`)
) ENGINE=InnoDB DEFAULT CHARSET=latin1 AUTO_INCREMENT=0;

INSERT INTO `classifications` VALUES (0001, 'G', 'green');
INSERT INTO `classifications` VALUES (0002, 'PG', 'yellow');
INSERT INTO `classifications` VALUES (0003, 'M', 'blue');
INSERT INTO `classifications` VALUES (0004, 'MA15+', 'red');
INSERT INTO `classifications` VALUES (0005, 'R18+', 'black');
```

Since a movie can only have one classification, radio buttons or a single selection pull-down list are the best ways to display them to the user on the edit or add page. The example below uses a single selection pull-down list.

```
<?php
$link = mysql_connect("127.0.0.1","root");
$db = mysql_select_db("movie_library", $link);

if(isset($_GET["Submit"]))
{
  if($_GET["Submit"] == "Update")
  {
    $sql = "UPDATE movies SET dvd_title='".$_GET["dvd_title"]."', director='".$_GET["director"]."', classification='".$_GET["classification"]."', actors='".$_GET["actors"]."', genre='".$_GET["genre"]."', year='".$_GET["year"]."', length='".$_GET["length"]."', classification_id='".$_GET["classification_id"]."' WHERE 'movie_id'='".$_GET["movie_id"].'";

    $result = mysql_query($sql, $link);
  }

  else if($_GET["Submit"] == "Add")
  {
    $sql = "INSERT INTO movies (movie_id, dvd_title, director, classification, actors, genre, year, length, classification_id) VALUES ('".$_GET["dvd_title"]."', '".$_GET["director"]."', '".$_GET["classification"]."', '".$_GET["actors"]."', '".$_GET["genre"]."', '".$_GET["year"]."', '".$_GET["length"]."', '".$_GET["classification_id"].'");

    $result = mysql_query($sql, $link);
  }

  if(isset($_GET["movie_id"]) && !isset($_GET["Submit"]))
  {
    $sql = "SELECT * FROM movies WHERE movie_id = '".$_GET["movie_id"].'";

    $result = mysql_query($sql, $link);
    $row = mysql_fetch_object($result);
    $movie_id = $row->movie_id;
    $dvd_title = $row->dvd_title;
    $director = $row->director;
    $classification = $row->classification;
    $classification_id = $row->classification_id;
    $actors = $row->actors;
    $genre = $row->genre;
    $year = $row->year;
    $length = $row->length;
```

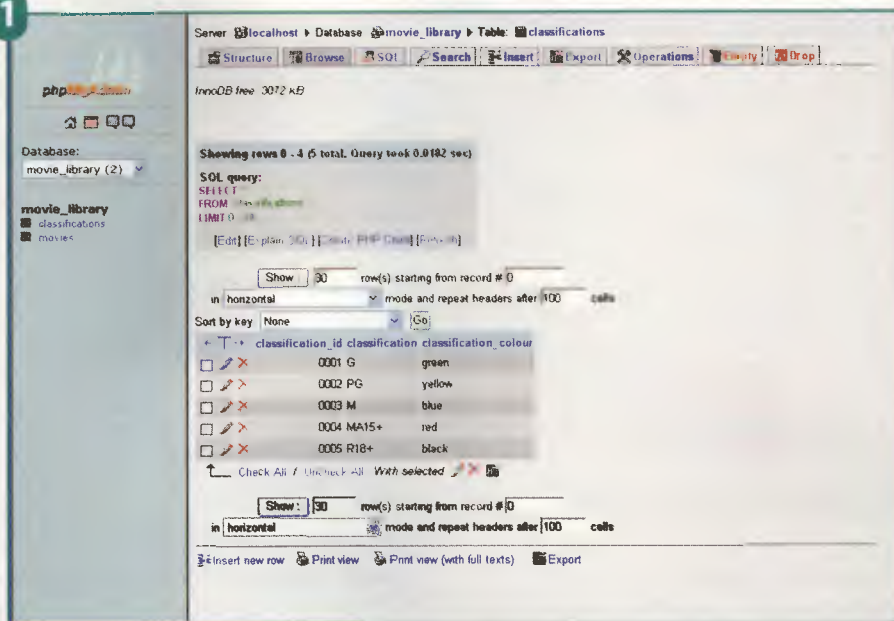
```

$edit = true;
}
else
{
$movie_id = "";
$dvd_title = "";
$director = "";
$classification = "";
$classification_id = "";
$actors = "";
$genre = "";
$year = "";
$length = "";
$edit = false;
}

?><TABLE BORDER="0">
<FORM METHOD="GET">
<?php if($edit) { ?>
<input type="hidden" name="movie_id"
value="<?php print($row->movie_id)?>">
<?php } ?>
<TR><TD>DVD Title</TD><TD><input
type="text" name="dvd_title" value="<?php
print($dvd_title)?>"></TD></TR>
<TR><TD>Director</TD><TD><input
type="text" name="director" value="<?php
print($director)?>"></TD></TR>
<TR><TD>Classification</TD><TD><input
type="text" name="classification"
value="<?php print($classification)?>"></
TD></TR>
<TR><TD>Classification</TD><TD><select
name="classification_id">
<?php
$sql = "SELECT classification, classification_id
FROM classifications";
$result = mysql_query($sql, $link);
while ($row = mysql_fetch_object($result))
{
print("<option value=\\"$row->classification_
id\\"");
if($classification_id == $row->classification_
id)
{
print(" selected=\\"selected\\"");
}
print(">$row->classification</option>\n");
}
?>
</select></TD></TR>
<TR><TD>Actors</TD><TD><input
type="text" name="actors" value="<?php
print($actors)?>"></TD></TR>

```

1



```

<TR><TD>Genre</TD><TD><input
type="text" name="genre" value="<?php
print($genre)?>"></TD></TR>
<TR><TD>Year</TD><TD><input type="text"
name="year" value="<?php
print($year)?>"></TD></TR>
<TR><TD>Length</TD><TD><input
type="text" name="length" value="<?php
print($length)?>"></TD></TR>
<?php if($edit) { ?>
<TR><TD><input type="submit"
value="Update" name="Submit"></TD>
<?php } else { ?>
<TR><TD><input type="submit"
value="Add" name="Submit"></TD>
<?php } ?>
<TD><input type="reset" value="Reset"
name="Reset"></TD></TR>
</FORM>
</TABLE>

```

The above code changes the data entry page from last month to allow the user to add and edit the movies using the data from the classification table. To facilitate this, the display of the movies needs to be changed to query both tables and join the results.

```

<TABLE BORDER="1">
<TR><TD>Title</TD><TD>Classification</
TD><TD>Genre</TD><TD>Year</
TD><TD>Action</TD></TR>
<?php
$sql = "SELECT * FROM movies, classifications
WHERE movies.classification_id =
classifications.classification_id";

```

```

$result = mysql_query($sql, $link);
while ($row = mysql_fetch_object($result))
{
print("<TR><TD>$row->dvd_title</TD>");
print("<TD bgcolor=\\"$row->classification_
colour\\" align=\\"center\\"><font color=\\"
white\\">$row->classification</font></TD>");
print("<TD>$row->genre</TD><TD>$row-
>year</TD><TD><A HREF=\\"test19.
php?movie_id=$row->movie_id\\">Edit</
A></TD></TR>\n");
}
?>
</TABLE>

```

To query the two tables is relatively simple in SQL. The query `SELECT * FROM movies, classifications WHERE movies.classification_id = classifications.classification_id` asks for all the fields from both the movies table and the classifications table and it uses the WHERE clause to join them together. This causes the rows in both tables, where the classification_id field has the same value, to be returned as a single row.

Not all fields that have a common set of data can be handled this way. Take the genre field. A movie can belong to multiple genres, a comedy thriller for example, so the relationship isn't quite as simple.

One way to approach this problem is to create a link table that links the movie and genre tables together. A table is created for the genre with two fields, genre_id and genre. The link table is then created, also with two fields, movie_id and genre_id. Every movie will have one or more rows in this table to represent each of the genres it belongs to.



2

```
CREATE TABLE `genres` (
  `genre_id` int(4) unsigned zerofill NOT NULL
  auto_increment,
  `genre` varchar(50) NOT NULL default '',
  PRIMARY KEY (`genre_id`)
) ENGINE=InnoDB DEFAULT CHARSET=latin1
AUTO_INCREMENT=3 ;

CREATE TABLE `moviegenre` (
  `movie_id` int(5) unsigned zerofill NOT NULL
  default '00000',
  `genre_id` int(4) unsigned zerofill NOT NULL
  default '0000'
) ENGINE=InnoDB DEFAULT CHARSET=latin1;

Add some genres to the genres table. Here is
the SQL to add Action and Sci-fi.

INSERT INTO `genres` VALUES (0001, 'Action');
INSERT INTO `genres` VALUES (0002, 'Sci-Fi');
```

Since movies can belong to more than one genre, the use of a pull-down list isn't appropriate when adding or editing them, so the page will be changed to use checkboxes.

```
<HTML>
<BODY>
Movie Database
<?php
$link = mysql_connect("127.0.0.1","root");
$db = mysql_select_db("movie_library",
$link);
if(isset($_GET["Submit"]))
{
if($_GET["Submit"] == "Update")
{
$movie_id = $_GET["movie_id"];
```

```
$sql = "UPDATE movies SET dvd_title='".$_GET["dvd_title"]."', director='".$_GET["director"]."',
actors='".$_GET["actors"]."', year='".$_GET["year"]."', length='".$_GET["length"]."',
classification_id='".$_GET["classification_id"]."' WHERE `movie_id`='". $movie_id;
$result = mysql_query($sql, $link);
}
else if($_GET["Submit"] == "Add")
{
$sql = "INSERT INTO movies (movie_id, dvd_title, director, actors, year, length,
classification_id) VALUES ('', '".$_GET["dvd_title"]."', '".$_GET["director"]."', '".$_GET["actors"]."', '".$_GET["year"]."',
".$_GET["length"]."', '".$_GET["classification_id"]."')";
$result = mysql_query($sql, $link);
$movie_id = mysql_insert_id(); // Get the id of
the last inserted row
}
```

Here (in the code) the rows in the link table that match the movie_id are deleted before the new rows are added. This is done for edits or adds.

```
// Remove previous entries if any for this movie
$sql = "DELETE FROM moviegenre WHERE
movie_id = $movie_id";
mysql_query($sql, $link);
$sql = "SELECT * FROM genres";
$result = mysql_query($sql, $link);
while ($row = mysql_fetch_object($result))
{
// Update the link table
if(isset($_GET["genre$row->genre_id"]) &&
$_GET["genre$row->genre_id"] == "on")
{
$sql = "INSERT INTO moviegenre (movie_id,
genre_id) VALUES ('$movie_id', '$row->genre_id')";
mysql_query($sql, $link);
}
}
if(isset($_GET["movie_id"]) && !isset($_GET["Submit"]))
{
$sql = "SELECT * FROM movies WHERE movie_id = '". $_GET["movie_id"]';
$result = mysql_query($sql, $link);
$row = mysql_fetch_object($result);
$movie_id = $row->movie_id;
```

```
$dvd_title = $row->dvd_title;
$director = $row->director;
$classification = $row->classification;
$classification_id = $row->classification_id;
$actors = $row->actors;
$year = $row->year;
$length = $row->length;
$edit = true;
}
else
{
$movie_id = "";
$dvd_title = "";
$director = "";
$classification = "";
$classification_id = "";
$actors = "";
$year = "";
$length = "";
$edit = false;
}
?>
<TABLE BORDER="0">
<FORM METHOD="GET">
<?php if($edit) { ?>
<input type="hidden" name="movie_id"
value="<?php print($row->movie_id)?>">
<?php } ?>
<TR><TD>DVD Title</TD><TD><input
type="text" name="dvd_title" value="<?php
print($dvd_title)?>"></TD></TR>
<TR><TD>Director</TD><TD><input
type="text" name="director" value="<?php
print($director)?>"></TD></TR>
<TR><TD>Classification</TD><TD><select
name="classification_id">
<?php
$sql = "SELECT classification, classification_id
FROM classifications";
$result = mysql_query($sql, $link);
while ($row = mysql_fetch_object($result))
{
print("<option value='".$row->classification_id.">");
if($classification_id == $row->classification_id)
{
print(" selected='selected'");
}
print(">$row->classification</option>\n");
}
```

```
?>
</select></TD></TR>

<TR><TD>Actors</TD><TD><input
type="text" name="actors" value="<?php
print($actors)?>"></TD></TR>

<TR><TD>Year</TD><TD><input type="text"
name="year" value="<?php
print($year)?>"></TD></TR>

<TR><TD>Length</TD><TD><input
type="text" name="length" value="<?php
print($length)?>"></TD></TR>
```

Here the code generates the checkboxes from the information that's contained in the genres table.

```
<TR><TD>Genre</TD>
<TD><?php
$sql = "SELECT * FROM genres";
$result = mysql_query($sql, $link);
while ($row = mysql_fetch_object($result))
{
    print("<input type='checkbox' name='
genre$row->genre_id'>$row-
>genre<br>");
}
?></TD></TR>

<?php if($edit) { ?>
<TR><TD><input type="submit"
value="Update" name="Submit"></TD>
<?php } else { ?>
<TR><TD><input type="submit"
value="Add" name="Submit"></TD>
<?php } ?>
<TD><input type="reset" value="Reset"
name="Reset"></TD></TR>
</FORM>
</TABLE>
<TABLE BORDER="1">
<TR><TD>Title</TD><TD>Classification</
TD><TD>Genre</TD><TD>Year</
TD><TD>Action</TD></TR>
<?php
$sql = "SELECT * FROM movies, classifications
WHERE movies.classification_id =
classifications.classification_id";
$result = mysql_query($sql, $link);
while ($row = mysql_fetch_object($result))
{
    print("<TR><TD>$row->dvd_title</TD>");
    print("<TD bgcolor='\"$row->classification_
colour\"' align='\"center\"'><font color='\"
white\"'>$row->classification</font></TD>");
    print("<TD>");
```

Here the code displays the genres that have been set for the movie by selecting the rows from the link table that have a movie_id matching the current movie_id.

```
$sql = "SELECT genre FROM genres,
moviegenre WHERE moviegenre.movie_id =
$row->movie_id AND moviegenre.genre_id =
genres.genre_id";
$genres = mysql_query($sql, $link);
if(!$genres) print(mysql_error());
while ($genre = mysql_fetch_object($genres))
{
    print("$genre->genre<br>");
}
print("</TD>");
print("<TD>$row->year</TD><TD><A HREF='
test20.php?movie_id=$row->movie_
id'>Edit</A></TD></TR>\n");
?>
</TABLE>
</BODY>
</HTML>
```

Now that the genre is linked in this way, it allows for the movies to be filtered by the genre very easily. As you can see, this is a powerful reason for structuring a database in such a way.

```
<HTML>
<BODY>
Movie Database - With Genre Filter<br>
<?php
$link = mysql_connect("127.0.0.1", "root");
$db = mysql_select_db("movie_library",
$link);
$sql = "SELECT * FROM genres";
$result = mysql_query($sql, $link);
while ($row = mysql_fetch_object($result))
{
    print("<A HREF='\"test21.php?genre=$row-
>genre_id\"'>$row->genre</A> ");
}
?>
<TABLE BORDER="1">
<TR><TD>Title</TD><TD>Classification</
TD><TD>Genre</TD><TD>Year</TD></TR>
<?php
$link = mysql_connect("127.0.0.1", "root");
$db = mysql_select_db("movie_library",
$link);
```

```
if(isset($_GET["genre"]))
{
    $sql = "SELECT * FROM movies, classifications,
moviegenre WHERE movies.classification_id =
classifications.classification_id AND
moviegenre.genre_id = \"$_GET['genre']"."
AND moviegenre.movie_id = movies.movie_id
GROUP BY movies.movie_id";
}
else
{
    $sql = "SELECT * FROM movies, classifications
WHERE movies.classification_id =
classifications.classification_id";
}
$result = mysql_query($sql, $link);
while ($row = mysql_fetch_object($result))
{
    print("<TR><TD>$row->dvd_title</TD>");
    print("<TD bgcolor='\"$row->classification_
colour\"' align='\"center\"'><font color='\"
white\"'>$row->classification</font></TD>");
    print("<TD>");
    $sql = "SELECT genre FROM genres,
moviegenre WHERE moviegenre.movie_id =
$row->movie_id AND moviegenre.genre_id =
genres.genre_id";
    $genres = mysql_query($sql, $link);
    if(!$genres) print(mysql_error());
    while ($genre = mysql_fetch_object($genres))
    {
        print("$genre->genre<br>");
    }
    print("</TD>");
    print("<TD>$row->year</TD></TR>\n");
}
?>
</TABLE>
</BODY>
</HTML>
```

Another significant benefit of this way of structuring data is that it also allows global changes to be made easily. For example, the user might want to change one of their genre descriptions from, "sci-fi" to "science fiction". To do this, all they have to do is change the value of one field in a row of data and all the movies in this genre will have their genre descriptions updated.

So, up till now you knew how to create a Web app, add records, build search methods and add an interface for the end user. Now you can get a little more complex and add classifications and genres (and implement global changes). 



apc downtime

HIGH PERFORMANCE PLAYTIME

GEAR

GAMES

BOOKS

CHIP CHAT





1 Lian Li PC-777

● PRICE \$575 ● ONLINE www.anyware.com.au ● VERDICT 4/5

 **1337**

To show how fast your PC is at the LAN party you need one of these "snail cases" from Lian Li. Uh, OK. While the wisdom of selling snails to performance-focused users is questionable, they do look pretty cool. Made to

celebrate Lian Li's 20th Anniversary, the PC-777 costs \$575 (silver) or \$590 (black). It includes 6 x 5.24in and 6 x 3.5in slots, two 12cm ball-bearing fans, space for an ATX motherboard (up to 12 x 9.6in) and seven PCI slots.

2 Age of Empires II: mobile phone edition

● PRICE \$6.60 ● ONLINE <http://mobilecentral.ninemsn.com.au/> ● VERDICT 4/5

 **1337**

It's bloody amazing what fits into 160KB these days. When we were young guns, Age of Empires took up a whole CD-ROM. Now you can get it on your phone. OK, the graphics are kind of repetitive, and it doesn't have

all the cool sounds — but the gameplay's good. So's the price: \$6.60 plus GPRS charges from your network (\$3.52 on average). Snake's better to play on the toilet though — this is more a doctor's waiting room game.

3 Samsung E530

● PRICE \$575 ● ONLINE www.samsung.com.au ● VERDICT 5/5

 **UBER**

The press release speaks for itself: "The new Samsung E530 pink mobile phone is a girl's best friend, equipped with calorie counter, megapixel camera, shopping list and it even tells the ladies when they're

ovulating!" Ovulation monitoring eh? We reckon Samsung is onto something here. It could add a feature into guys' phones too: "a PMT calendar", to let you know when to bring home a bunch of flowers etc.

4 Motorola SLVR

● PRICE \$599 ● ONLINE www.motorola.com.au ● VERDICT 4/5

 **1337**

You don't buy a Motorola RAZR phone for the user interface or features, but because it looks ultra-cool. Problem is they're also bloody expensive, mainly for the \$150/mth contract set. Now, Motorola's released

the SLVR: about as thin as RAZR but in the standard candy-bar form. You get a free Motorola H500 Bluetooth headset and a 128MB micro-SP memory card, and it looks sooooo good!

5 Altec Lansing Inmotion IM7

● PRICE \$449.95 ● ONLINE www.innovision.com.au ● VERDICT 3/5

You've splurged \$600 on a video iPod, and you've still got \$449.95 burning a hole in your pocket? Yeah, it happens to us too. This hot new doof-doof speaker system is just the thing. It has a four-inch side-firing

sub-woofer, additional audio input, and video output jack (no need for Apple's pricey A/V cable or universal dock). Sadly, it lacks an external dock connector to let you use it to sync your iPod with your computer.

6 ICans

● PRICE \$200 ● ONLINE www.icans.com.au ● VERDICT 4/5

 **1337**

These studio-quality "cans" fold for storage in a compact can. From German headphone manufacturer Ultrason, they're designed to be safer for your ears. The sound's as loud as other headphones but with up

to 40% lower dB output. They also have ultra-low magnetic emission. Ultrason claims the average magnetic field of headphones is more than 1000 nanoteslas (nT). Yet these iCans emit only 90 nT.

7 Tetran

● PRICE US\$12.95 ● ONLINE www.tunewear.com/english/product/tetran/ ● VERDICT 3.5/5

It's so obvious! Someone had to invent it sooner or later: a combined stress-relief squeeze toy and headphone cable organiser. Tetran lets you wind your cable around its cute spiky body and feed its mouth

with your earbuds. The makers claim stress-relieving properties: imagine it's your boss's head and crush it in your hand, or roll it under your foot for a foot massage. Sounds like BS to us, but Tetran is so cute and squidgy!

8 Sony DHC-AZ7DM

● PRICE \$1099 ● ONLINE www.sony.com.au ● VERDICT 1/5

 **noob**

Sony says this DVD mini hi-fi system is the "ultimate in connectivity". The PR flack should be sacked: "ultimate connectivity" is limited to connecting to your PC via USB. A hi-fi system with a DVD player is likely to be near

a TV, not a PC. To be "ultimate", it would have built-in Wi-Fi and Ethernet, but no. On the upside, the USB port can be used to play music directly off flash memory keys, and the DVD player can decode DivX files.



In one life you're Declan Kennedy, games reviewer...

You call that a package, Neo?



Woah, Trinity, look at me! Aw... come on... look!



Uh, Neo? Is that a bullet trail coming out of your...



Yes, I am interested in subscribing to APC, but this is not a good time...



Uh, yeah... like, pan base, please...

The Matrix: Path of Neo

Another Matrix game? Declan Kennedy fastens the clips on his favourite latex trenchcoat, greases up, then goes in swinging.

● CONTACT Atari ● ONLINE www.atari.com.au ● PRICE \$89.95 ● VERDICT 2/5

● GOOD Environmental variety: kept the cast off the streets for another year. ● BAD Bugs, bugs, BUGS!!! And it's boring.

Making a video game from a movie franchise is fraught with danger. Enter the Matrix underlined this quite well; sure, it was *Matrix*-esque enough to please the obsessed fans, but putting the player in control of characters who are mere bit players in the films was a big mistake, because all the kiddies want to be Neo. Well, there are kids who don't want to be Neo, but they're the guys who beat you up in high school, remember? We'll show them...

Path of Neo (PoN) demonstrates that the Wachowski brothers have realised that their market is comprised largely of nerds, and that nerds are powerless weaklings (even though we sometimes try and hide it with body piercings and gym memberships). It's the first Matrix game which allows you to step into Neo's booties — then proceed to slam said booties repeatedly into the heads of all those mean bullies... uh, I mean Agents.

The first thing that needs to be said about the game is that

it's not finished. Yes, all of the levels are there, but so are some of the worst bugs I have ever encountered in any game, let alone a big-money title like this one.

Settings which have been modified will almost always revert back to their default as soon as you quit the game. This is particularly frustrating in the case of screen resolution, which, when changed, forces the game to quit back to Windows, security checks your DVD, then loads the game from scratch.

Once you finally manage to get playing, things don't get much better. In gameplay terms, the combat is boring, based around two keys; attack and disarm/block. You never feel like you're actually in control, but rather are issuing very basic commands like "Take out that guy!", "Run up that wall!" and "Fire that invisible gun!"

Don't expect to see any new footage from the films either; when they say "re-cut" they mean "chopped together with a slamming soundtrack then placed higgledy-piggledy

throughout the game". It's as cynical a marketing exercise as you'll ever see.

As far as graphics go, the engine uses extensive rag-doll physics, which look quite impressive, but only comes into play after a model is airborne. Before that point, the collision detection is almost non-existent; you'll see arms, legs and gun-barrels protruding through walls all over the place.

The shaders look awful, which I assumed was caused by my video card. However, the mandatory patch (which, according to Atari, will be shipping with the game) didn't fix any of my issues: the framerate is seriously unstable; surfaces and entire models vanish during gameplay; and the soft-body system used for cloth and hair usually just results in clipping errors.

If this was on an Xbox, fine; but when you see the visual extravaganza that is F.E.A.R. or Call of Duty 2 on a hotted-up PC, this game just looks woefully outdated (even when playing at 1,280 x 1,024 and with the



maximum rendering detail turned on).

It's not all awful though. The environments you visit are many and varied, with some areas as surreal as if they had been designed by Escher and Dali's love child. Sadly, the gameplay just isn't distinct enough to be interesting. Basically, it always comes down to button mashing. Even a level like the battle with a million Agent Smiths from *Reloaded* somehow manages to be boring, largely because it's not very different from fighting a million SWAT troopers.

This game has proven unequivocally that *The Matrix* franchise is over. If you're one of those obsessive types who must buy everything *Matrix*, then perhaps putting the money towards a shiny new black trenchcoat is your better bet.

King Kong

What do you call a 200kg gorilla with a machine gun? Sir. What do you call a 25ft gorilla with a scantily clad Naomi Watts? A very lucky monkey. *Declan Kennedy enters the jungle.*

● **CONTACT** Ubisoft ● **ONLINE** www.kingkonggame.com ● **PRICE** \$79.95 ● **VERDICT** 4/5

● **GOOD** Cinematic, exciting and unique; you get to be a huge monkey. ● **BAD** Craptacular camera angles in the Kong levels.

If the *Lord of the Rings* taught us anything, besides the fact that elves are mincing nancy boys, it was the awesome skill of Peter Jackson as a maker of epic adventure stories. And it looks like *King Kong* will be just as impressive. If it's even half as captivating as the game, the film will knock your socks off.

Visually, *King Kong* is exceptional. The normal mapping is subtle but effective, smoke, mist and fog effects are abundant and are made even more convincing because they always seem to swirl gently in the gloomy jungle light.

Character models look top notch, but the lip-synching is

pretty poor considering that dialogue plays a key role in developing the story. Still, you can't fault a modeller who can make a Naomi Watts model that looks so real that you really do want to protect her, just on the off chance that she'll be grateful enough and go out with you.

You alternate between controlling Jack, a human, and Kong, a gigantic sociopathic primate (who just wants to be loved). The Jack missions are first-person, but there's no HUD whatsoever. Want to know how much ammo you have? Press the inventory button, and Jack will tell you out loud. Different, and very groovy.

Weapons are standard, except for the spears (spearing dinosaurs and giant centipedes is fun, full stop).

Sadly, the Kong missions are a lot less fun; they shouldn't be, but the developers opted for "cinematic" angles in these sections (which is a gaming euphemism for "Pain! Horrible stabbing pain!").

At around six hours, it's too short by about four hours. The Kong levels do have painful camera problems, and the CD security system will probably make you furrow your brow like a monkey. However, as a whole, this is a truly classic game experience.



"Silencio..."



Getting your pets to take their worm tablets can be a real chore.

Football Manager 2006

Did Australia's World Cup qualification whet your appetite for the Beautiful Game? *Daniel Withers takes on the likes of Alex Ferguson.*

● **CONTACT** THQ ● **ONLINE** www.slgames.com/fm ● **PRICE** \$79.95 ● **VERDICT** 4.5/5

● **GOOD** Highly detailed simulation. ● **BAD** Complexity may be daunting for newcomers.



Australia's favourite son (with a custom skin to brighten the game's appearance).



"Gooooaaaaaalllllll!"

Football Manager 2006 is the latest instalment from Sports Interactive, creators of the award-winning Championship Manager series. Football Manager 2005 was widely regarded as the best of its kind, but the 2006 edition is better still. There's greater interaction with your players, such as half-time team talks where you can pep them up. More on-field tactics are available than ever before, adding further realism to the game. Your players can interchange positions, engage in time wasting to protect a narrow lead, and are now easier to direct.

The training module has also been improved, giving more

interaction with the coaching staff and letting you target individual areas of your players' talents.

There's greater negotiation with your board, including the chance to haggle over transfer funds. To top it all off, the 2006 database includes a massive 275,000-plus players, managers and staff from over 5,000 teams in 50 countries, with each team providing different challenges and board expectations. When you're tired of running Chelsea, try managing Hereford United for a more difficult test.

That's just a summary of the massive list of enhancements for this year's delivery, reflecting its engrossing detail and depth.

No longer can you take a team through a season with tried and tested tactics and expect to win big; you have to constantly tweak your team's formation and tactics to make sure you come away with the three points. This realism, however, may not suit a casual gamer; the "pick up and play" quality of previous versions is lost.

But, Football Manager 2006 is a vast improvement on its predecessors and has enough depth to satisfy even the most hardcore football supporter. Sports Interactive has delivered the goods once again with a sensational replication of the life of a football manager.



Taito Legends

Think building a MAME cabinet is too much bother? *Dan Chiappini* takes all the hard work out of retro gaming and relives the classics (without getting off the couch).

● **CONTACT** Red-Ant ● **ONLINE** www.red-ant.com.au ● **PRICE** \$49.95 ● **VERDICT** 3.5/5

● **GOOD** Relive your arcade glory days. ● **BAD** Relive your arcade glory days.

Whether you're a recent convert to the gaming scene or a seasoned veteran, it's important to know where it all began and how far we've come.

Taito is responsible for helping to shape the gaming scene by inventing some of the best titles ever released, which dominated the arcade market in Japan and abroad. Sure, today's games are all about photo-realism, true-to-life situations and surround sound, but there are some games that you never really outgrow, and Taito has whacked together 29 of these old favourites for the PS2.

Play all the classics again to your heart's content (without

feeling guilty about sinking dollar after dollar into the Bubble Bobble tabletop down at your local pub). Other faves include: Battle Shark, Elevator Action, Operation Wolf, and the game that started it all — Space Invaders. If you don't have a soft spot for games of this calibre, all the dynamic lighting and shader porn in the world won't save you.

The games have been lovingly transferred (in all their spritely goodness) with a new animated interface, complete with rendered images of their original arcade cabinets. Each game has a brief description, instructions and most include

extras such as original flyer art. Bubble Bobble and Space Invaders, probably the two best-known Taito games, also include interviews with their creators, Tomohiro Nishikado and Fukio Mitsuji. These only run a few minutes and miss the boat on the big questions (*A Current Affair* it ain't), but it is a nice extra.

On the whole though, TL is cheap and nostalgic; a great pick-up-and-mash-the-buttons game — guaranteed to give you a deeper appreciation of today's games. It's also available on PC (but you'll need to grab an analogue control stick for that authentic arcade feel).



BB: best game ever... 'nuff said.



Op Wolf: America's Army for yesteryear.



The Movies

Sick of the crap coming out of Hollywood nowadays? *John Gillyooly* doesn't get mad, he gets even.

● **CONTACT** Activision ● **ONLINE** www.themoviesgame.com ● **PRICE** \$89.95 ● **VERDICT** 3.5/5

● **GOOD** A refreshing twist on some tried and true game concepts. ● **BAD** Intense micromanagement; not to everyone's taste.



"Frankly, my dear, I don't give a damn... just get me a beer."



Build sets from the ground up for your *Back to the Future 3* homage.

Building upon a strong heritage of management games, *The Movies* is a curious fusion of *The Sims*, *Theme Park* and *Windows Movie Maker* (thrown into a blender to create a tasty gaming milkshake).

Traditionally, games like *Theme Park* have been all about building and maintaining a physical locale. *The Movies* turns this concept on its head: you build up your studio lot by placing buildings, paths, toilets and the like. Then, you hire an assortment of staff from janitors to actors and set them loose on your studio lot. Sound familiar? Well, unlike other games (where construction is the be all and end all of gameplay), *The Movies* packs a twist.

Once your lot is up and running, you commence making movies. Starting with a script, you cast actors and crew, assign sets and start filming. Once the movie is made you release it to the public and hopefully watch the accolades and cash roll in.

A good movie is the sum total of your efforts in the game. Your actors are temperamental types, which mean you need to manage both their happiness levels and their social interactions to get better performances. You can choose from pre-made scripts or spend time tweaking and rearranging pre-canned scenes to make your own. It can be a surprisingly flexible and creative

process, and the game even comes with a sandbox mode so you can ignore the studio building side and focus on making that western zombie romance you always secretly wanted to see. Then, export the resulting movie and upload it to the games' Website so all and sundry can enjoy your opus.

All of this combines to make an enjoyably different gaming experience; the only real failing is that at times it requires excessive micromanagement. But, if you approach *The Movies* as *The Sims* (but with a purpose) it delivers a refreshing, highly replayable game suitable for a wide range of ages and tastes.

Why are you wearing that stupid human suit?





[Fit for an angel]

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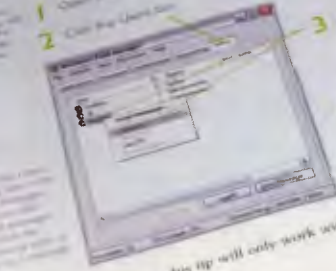
Bruce Fries & Marty Fries

1

Teleportation

The Impossible Leap

Switch Users Quickly



Note that this tip will only work with users that are actually logged on.

1 Teleportation: The Impossible Leap

PRICE \$38.95 PUBLISHER John Wiley & Sons ISBN 0471470853

Who hasn't wanted the ability to instantaneously beam themselves elsewhere? Here, David Darling examines teleportation — not pie in the sky dreaming, but examples of the science in action to date, as well as a look at its social and technological implications (although the cultural aspect is given relatively short

shrift). There are two main problems. Firstly, despite the promise of fledgling steps, the technology isn't going anywhere soon in a hurry. Second, as hard as Darling tries to break down the science into digestible chunks, Teleportation can be pretty heavy going.

Justin Kranz

2 Digital Audio Essentials

PRICE \$65.00 PUBLISHER O'Reilly ISBN 0596008562

This is a primer for anyone wanting to get into computer-based audio. Starting out with a look into computer hardware and how it can be integrated with a home stereo, this book proceeds to cover listening to (and organising) digital music, technical details of what digital audio actually is and how it compares to analogue formats, and the creation, editing and

distribution of music online. Although somewhat patchy in parts, as a whole the book is a successful introduction to the topic. If there was a broader examination of reader options, less white space on its pages (and a price tag under \$50), it may have been in the running to be the ultimate digital audio primer.

Dan Winter

3 IM Instant Messaging Security

PRICE \$100.00 PUBLISHER Elsevier ISBN 1555583385

When you pay \$100 for a book, you expect solid, relevant content. The problem with the US-centric IM Security is that nearly half of it is taken up with appendices covering largely generic security issues such as wireless LAN security, acceptable use policies and the training and certification of security

professionals. This isn't the book on IM security that IT professionals really need. A second edition, focused exclusively on IM security (one-quarter the length and one-third the price), would be more likely to be purchased and read by those who would benefit from it.

Stephen Withers

4 Red Hat Fedora and Enterprise Linux 4 Bible

PRICE \$77.95 PUBLISHER Wiley Publishing ISBN 0764595768

It seems to me that writing books on Linux is very popular and trendy these days, and *Red Hat Fedora and Enterprise Linux 4 Bible* (RHFEL4B) is one of the better ones out there. At 1,100 pages, the author thoroughly explains many topics in a straightforward and accessible manner. The book is aimed at people

who are new to Linux but even those with a little experience will find some sections useful. With Fedora Core 4 and KNOPIX on the included DVD (or Fedora Core 4 on the included CDs), you shouldn't need much more than this. Highly Recommended.

Peter Sbarski

5 Car PC Hacks

PRICE \$44.95 PUBLISHER O'Reilly Media ISBN 0596008716

The great thing about in-car computing for hobbyists is that all the ugly seams haven't been ironed out yet. In short, it's heaven if you like tinkering. This book is aimed at both "car guys" and "PC guys", and gives you an overview of the myriad of options when setting up an in-car PC for playing DVDs, music, games, and

navigating. It'll help to have had some electrical experience, but for the most part this is written (by 15 hobbyist authors) for everyday PC users. In the future we'll take in-car gadgets like these for granted, so read this book now and you can say you were there first.

William Maher

6 Windows XP Tips & Tricks in Easy Steps

PRICE \$29.95 PUBLISHER Computer Step ISBN 1840782978

Quick, how do you prevent Windows XP from paging its kernel to the Page file? (You'd do this to keep the kernel in RAM to improve system performance). Or, how do you force XP to unload DLL files? If you're still scratching your head (or if you can't answer one of these questions in, say, five seconds), then you might

want to take a quick look at *Windows XP Tips and Tricks in Easy Steps*. The title is a little on the misleading side: Stuart Yarnold's book has various tips and tricks that experts, not just beginners, will find very useful. The same goes for the sister book, *Linux in Easy Steps*.

Tony Sarno





DEBUGGING Microsoft.com



Chip Chat was pretty surprised when 64-bit Windows chief Clyde Rodriguez volunteered in a past interview that the team that runs the Microsoft.com Web site has to manually restart processes all the time because they were "literally suffocating" in 32-bit Windows. But now the Softies have gone further to publicise the failings of Windows Server, producing a 38-minute video in which they bemoan the nightmare it faces with Windows memory leaks and how it has to restart server processes manually every five minutes. You can watch the video yourself at Microsoft's Channel Nine developer site: <http://channel9.msdn.com/Showpost.aspx?postid=136904> (that is, unless Steve Ballmer has ordered the video to be taken down by the time you read this.)

MC HAMMER and La Cucaracha

The data recovery business is getting tougher, according to Sydney-based OnTrack Data Recovery. It lamented to APC recently that it had worked on some bamboozling jobs in the past year:

- One customer pleaded with OnTrack to do all it could to recover the baby photos he had deleted from his hard drive (because his wife was threatening deletion-related divorce).
- One man attempting data recovery from his computer found the job too challenging and sent OnTrack his

completely disassembled drive — with each of its parts in a separate Glad cliplock bag.

- One frustrated writer supplied her notebook computer for data recovery with the perfectly shaped imprint of a hammer clearly visible on the smashed lid.
- A laptop that had been sitting in a warehouse wouldn't switch on — and when OnTrack's engineers cracked the case, they discovered it was seething with live cockroaches and the husks of dead and decaying ones.

BigPond's pink appeal

APC reader Nigel Quayle of Smithfield Heights, Qld, was surprised to receive an odd email from Telstra BigPond. The sender name was "Camp Expiry", and the subject line was "Six appeal - six months at half-price reminder". Nigel wondered if BigPond was trying to spruik its sex appeal in New Zealand. "I am neither gay nor going to any camp, so I was not interested in any expiry of this nature," bristled Nigel. "It's given the guys in Product a chuckle," BigPond spokesman Craig Middleton told Chip Chat. "Somehow the automated delivery system has errantly used Camp Expiry as an abbreviation for Campaign Expiry (ie. his six months half-priced broadband had ended). I know we are working hard on identifying customer segments at the moment, but gay New Zealanders is not one of them..."

Now with random encryption

One security vendor, that handed out its press kit with a memory key included, unwittingly added a truly unique "feature": asymmetric randomised encryption with impenetrable intruder security. Translation: any data copied onto the memory keys was randomly corrupted and then the units died altogether shortly afterwards. Stay tuned, the IT industry will shortly return to its regular programming of laser pointers with five-colour flashing LEDs built in to the barrel.



Windows origami edition

Just in case you want to reinstall Windows XP one last time before upgrading to Vista, Microsoft Japan has released a special commemorative "20th Anniversary" edition. Only 9,999 of the packs will be made, and the investment buy-in price is only \$320. For your hard earned cash, you get a standard upgrade copy of Windows XP and replica (non-working) install CDs for Windows 95, 98, ME and 2000. There's also an origami Windows box, stickers, stamps and a video of Bill Gates (wake us up when it's over). 20 randomly selected packs will be autographed by the man too, and five lucky Japanese enthusiasts will win a free trip to Microsoft HQ to complete their Windows worship ritual.

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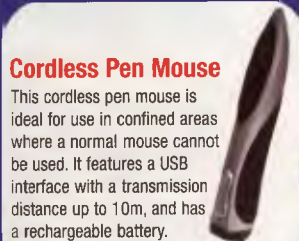
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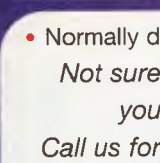
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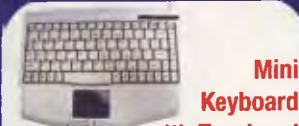
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Canon Toner

Model	Genuine	TONNY
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EP-25	\$ 99.00	\$49.00
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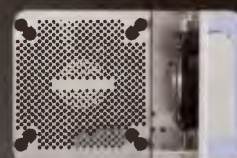
120mm Air Flow Duct for 12cm fan



5.25" bay converted to 3.5" bay with aluminium FDD bezel (5 x 5.25" bays)



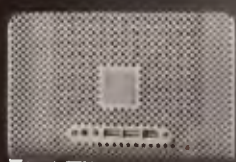
Perforated panels allow for improved ventilation



12cm ball bearing fan with filter, removable sound dampening cover and anti-vibration rubber ring in rear panel



120mm Blower Fan



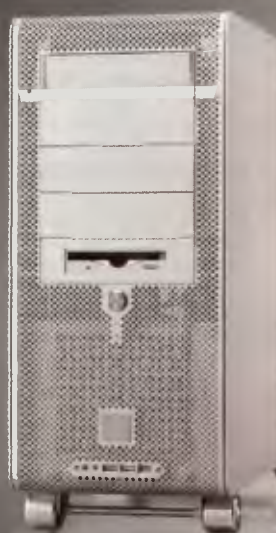
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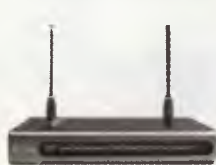


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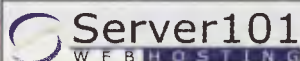
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Super fast turnaround / Competitive Prices
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www.diskmax.com.au

DISKMAX (02) 9699 3333

harristechnology



BACK TO BUSINESS HOT DEALS



NEW

Intel Centrino 1.7GHz
512MB memory
Double Layer DVD burner
Wireless LAN

**SAVE \$100 ON OUR
ALREADY LOW PRICE**

\$1699

TOSHIBA

TOSHIBA TECRA
SEE PAGE 15 FOR DETAILS

**COLOUR LASER
PRICE BREAKTHROUGH**

\$529



SAMSUNG

SEE PAGE 51 FOR DETAILS

**BONUS
\$100
COLES MYER
VOUCHER**

**POWERFUL
NEW
MICRO
PORTABLE
PROJECTOR**



**EXCLUSIVE
\$2499**

SEE PAGE 16 FOR DETAILS

TOSHIBA

ONLY 1KG

CALL 1300 13 9999

CLICK ht.com.au

VISIT See back for details

JANUARY 2006

Prices available from 1 to 31 January 2006

DELIVERY
ONLY

Some items in this catalogue are for
delivery only. Delivery charges apply.

MANAGE YOUR HARRIS TECHNOLOGY SUBSCRIPTIONS ONLINE

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ONLINE SUBSCRIPTION CENTRE

To help you more **easily manage your communication preferences** with us, we've launched an exciting new feature on our website.

We now offer a complete Subscription Centre at ht.com.au – so you can manage both your subscription preferences for email, mail and phone online and update your Contact Details, so we'll always know where to reach you.

HOW IT WORKS

To access the Subscription Centre, **you will need to be a registered website user**. Registered users simply Log On as usual with your email address and password. Once logged on, use the links to the left to update your Contact Details, manage your Address Book or Manage Subscription.

There will be a link to the Subscription Centre at the bottom of every email communication you receive from us, which you can use to unsubscribe if you no longer wish to hear from us.

Tip – To ensure you receive offers via email, please select at least one 'Regular Email Communication' or 'Special Email Offers and Promotions' option. Otherwise we won't know what types of offers you are interested in and you may not receive any emails from us.

WHAT IF I HAVEN'T REGISTERED BEFORE?

If you have not previously registered, go to ht.com.au/register and enter the requested details. Once this is complete, go to Step Two as detailed to the right.

LOGGING OFF

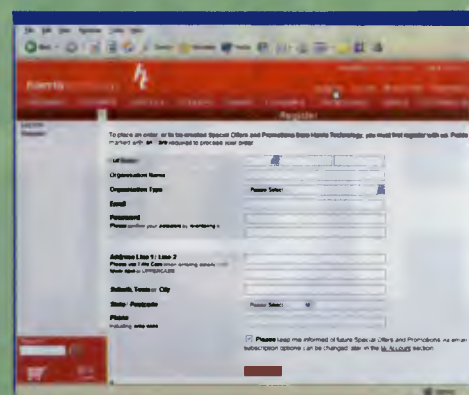
To Log off when you have finished your website session, please click on My Account at the top right of the page and use the Log Off link that appears to the left.

We hope you'll find this new website feature useful, and we look forward to continuing to **share our latest and greatest offers** with you via your chosen communication methods.

ERROR NOTICE:

Please note there is an error on page 18 of this catalogue.

The AcerPower F5 at \$999 should be **500MHz** instead of the 800MHz indicated. We apologise for any inconvenience caused.



STEP ONE – LOG ON OR REGISTER

Registered users will be able to Log On as normal using their email and password. First time users will need to follow the instructions to the left under 'WHAT IF I HAVEN'T REGISTERED BEFORE?'



STEP TWO – SUBSCRIPTIONS

Once you have logged on, click the Manage Subscriptions link to the left of the page.



STEP THREE – UPDATE

Make any desired changes and click the 'UPDATE' button at the bottom of the page. It's that simple!

FlyBuys

Make it count

harristechnology



CALL, CLICK OR VISIT

GREAT NEWS FOR **FlyBuys** MEMBERS!



save
14¢ per litre
on petrol
Limited time only



Convert

1,000 FlyBuys points into a Fuel Voucher to save 10 cents per litre on fuel (cannot be used in isolation).

Combine

with a Fuel Discount Receipt received when you spend \$30 or more in one transaction at **Coles, Bi-Lo or Liquorland**.

Save 14¢ per litre on petrol.

Now you can convert your FlyBuys points to Fuel Vouchers. Your first step is 1,000 FlyBuys points. Take advantage today by earning FlyBuys points on all your purchases from Harris Technology!*

How to convert FlyBuys points to Fuel Vouchers.

Visit FlyBuys.com.au to convert points OR Call **13 1116** with your member details

FlyBuys Fuel terms and conditions: offer available from 21/11/05 until 31/1/06 through FlyBuys, Coles Express and participating Coles Myer stores. Flybuys points cannot be collected at Officeworks, Quaffers or Theo's Liquor. Fuel discount redemption available until 30/4/06 and only at Coles Express. FlyBuys members must redeem 1,000 FlyBuys points to receive a FlyBuys Fuel Discount Voucher ("Voucher") and spend \$30 or more in one transaction at participating Coles Myer stores including Coles (excluding Coles Express), Bi-Lo and Liquorland to obtain a 4 cents per litre (or other amounts which may be stated on a Receipt) Fuel Discount Receipt ("Receipt"). The Voucher entitles you to receive an additional discount of 10 cents per litre off the pump price for all fuels including LPG and Diesel at Coles Express service stations when presented before its expiry date with a valid Receipt. Limit of one Voucher and one Receipt per fuel purchase up to 150 litres per customer. Voucher only valid for one transaction and must be used with a valid Receipt. Offer not to be used in conjunction with any other offer unless otherwise specified. Voucher or Receipt not valid if defaced, damaged, altered, past its expiry date or a copy. Vouchers and Receipts must be surrendered on redemption. Voucher or Receipt not valid for Fleet Card, Shell Card, Motorcharge or Motorpass purchases. Offer excludes purchase of tobacco products in Queensland from 31/12/05 and Gift Cards. Coles Express fuel discount terms and conditions also apply, see in store or online at colexpress.com.au for full details. Separate terms and conditions apply to the redemption of FlyBuys points for Vouchers, see the FlyBuys website for details.

*Earn 2 standard FlyBuys Points for every \$5 spent at Harris Technology.



i n v e n t

HP COMPAQ NOTEBOOKS

PERFECT UPGRADES
FOR JANUARY

HP DOCKING STATION



R6661

\$215

HP ADVANCED DOCKING STATION



R6662

\$275

HP TRAVEL BATTERY



R6672

\$195

HP L1706 17" TFT MONITOR



S9519

\$499

MICROSOFT OFFICE 2003 BASIC

Purchase a HP notebook and get an OEM Microsoft Office Basic 2003 which includes Word, Excel, and Outlook.

S2164

\$199

HP NOTEBOOK MOBILE PACK

- 128MB MP3 Player
- Carry bag
- Cordless mouse

S8134

\$99

*RENTSMART

The figures quoted are based on a per week basis over 3 years. Terms and conditions apply.

PLEASE NOTE:

All purchases subject to terms & conditions and returns policy. Delivery charges may apply. Not all items stocked in store but available for pick-up/delivery.

HP COMPAQ nx6120 SERIES

PACKED TO PERFORM, PRICED TO PLEASE

The HP Compaq nx6120 Business Notebook is packed with advanced technology features offering solid performance at a surprisingly affordable price. What's more, most models come with wireless connectivity so that you can get the job done effortlessly, wherever your work takes you.

GREAT
VALUE

MODEL	nx6120	nx6120	nx6120	nx6120	nx6120
PROCESSOR	Cel-M 360	Cel-M 360	P-M 740	P-M 740	P-M 740
CLOCK SPEED	1.4GHz	1.4GHz	1.7GHz	1.7GHz	1.8GHz
RAM	256MB	256MB	512MB	512MB	512MB
HARD DRIVE	40GB*	40GB*	40GB*	60GB*	80GB*
SCREEN	15" XGA	15" XGA	15" XGA	15" XGA	15" SXGA
OPTICAL DRIVE	Combo	DVD±RW	DVD±RW+DL	DVD±RW+DL	DVD±RW+DL
WIRELESS LAN		802.11g	802.11g	802.11g+BT	802.11g+BT
WARRANTY	1 year	1 year	1 year	1 year	1 year
RENT*	\$14.51/wk	\$16.75/wk	\$19.60/wk	\$22.36/wk	\$24.52/wk
PART NUMBER	R7182	C9273	F7734	C7197	E5919
PRICE	\$1,295	\$1,495	\$1,749	\$1,995	\$2,295

HP COMPAQ nx8220 SERIES

HIGH-END PERFORMANCE IN A THIN AND LIGHT
WIDESCREEN DESIGN

The HP Compaq 8200 series Notebook PCs combines the processing and graphics power of a desktop with the mobility and convenience of a notebook. It offers users high performance processing and graphics capabilities in a travel friendly, thin and wide form factor. Mobile professionals will like the thin, sleek design combined with the advantages of a 15.4" widescreen display and desktop equivalent performance.

HOT
PRICE

MODEL	nx8220	nx8220	nx8220
PROCESSOR	P-M 750	P-M 760	P-M 760
CLOCK SPEED	1.8GHz	2GHz	2.1GHz
RAM	512MB	512MB	1GB
HARD DRIVE	60GB*	80GB*	80GB*
SCREEN	15.4" WXGA	15.4" WSXGA+	15.4" WSXGA+
OPTICAL DRIVE	DVD±RW	DVD±RW	DVD±RW
WIRELESS LAN	802.11a/b/g+BT	802.11a/b/g+BT	802.11a/b/g+BT
WARRANTY	1 year	1 year	1 year
RENT*	\$24.52/wk	\$28.83/wk	\$37.45/wk
PART NUMBER	F7736	F7735	S2919
PRICE	\$2,295	\$2,699	\$3,595

*Accessible capacity of hard drive may be less due to pre-installed software and recovery partition.

HP DESKTOPS

HP DX5150 SMALL FORM FACTOR PC'S

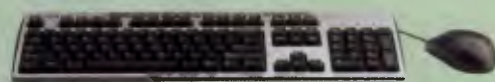
The HP dx5150 Business PC delivers a competitive blend of powerful performance, valuable features and attractive pricing, making it ideal for businesses that require advanced computing power and productivity with low ownership costs.



PROCESSOR	AMD Athlon 64 3000+ 1.8 GHz	AMD Athlon 64 3000+ 1.8 GHz
RAM	256MB	512MB
HARD DRIVE*	80GB (7200 rpm)	80GB (7200 rpm)
OPTICAL DRIVE	Combo Drive	Combo Drive
OPERATING SYSTEM	Windows XP Home	Windows XP Professional
RENT*	\$10.63/wk	\$11.98/wk
PART NUMBER	T0705	T0706
PRICE	\$949	\$1,069

HP DX2000 MICROTOWER PC'S

Combining essential features and affordability, the HP Compaq Business Desktop dx2000 is a simple low-cost PC built with proven technology that is ideal for budget conscious users and everyday applications.



PROCESSOR	Intel Celeron D 330 2.66GHz	Intel Pentium 4 3.0E 
RAM	256MB	256MB
HARD DRIVE*	40GB (5400 rpm)	40GB (5400 rpm)
OPTICAL DRIVE	CD-RW	CD-RW
OPERATING SYSTEM	Windows XP Professional	Windows XP Professional
RENT*	\$8.95/wk	\$11.19/wk
PART NUMBER	P7050	P7052
PRICE	\$799	\$999

*Accessible capacity of hard drive may be less due to pre-installed software and recovery partition.

HP DC7600 ULTRA SLIM DESKTOP PC



Image for illustration purposes only.

- Intel Pentium 4 3.0GHz with HT Technology
- 512MB RAM memory
- 80GB# (7200 RPM) SATA hard drive
- Keyboard & mouse included
- Windows XP Professional operating system
- 3 year limited onsite warranty on parts & labour



DC7600 WITH CD-ROM DRIVE

Rent* \$15.12/wk
\$1,349

S7141

DC7600 WITH COMBO DRIVE

Rent* \$15.68/wk
\$1,399

S7142

*RENTSMART

The figures quoted are based on a per week basis over 3 years. Terms and conditions apply.

PLEASE NOTE:

All purchases subject to terms & conditions and returns policy. Delivery charges may apply. Not all items stocked in store but available for pick-up/delivery.

HP DIGITAL PROJECTORS

VP6315



- 1600 ANSI lumens
- SVGA resolution
- 3.5kg total weight
- DLP technology for high 2000:1 contrast ratio
- 4000 hour lamp life
- 2 year lamp warranty for peace of mind

Rent* \$17.92/wk

S3311

\$1,599

MP2225



- 1400 ANSI lumens
- XGA resolution
- 1.1kg, one of the smallest on the market
- DLP technology for high 2200:1 contrast ratio
- 4000 hours lamp life (eco mode)

Rent* \$29.37/wk

S9469

\$2,749

XP8010



- 2600 ANSI lumens
- XGA resolution
- RJ45 access to 10/100 network and ability to be remote asset managed

Rent* \$43.51/wk

M0914

\$4,599

*RENTSMART

The figures quoted are based on a per week basis over 3 years. Terms and conditions apply.

PLEASE NOTE:

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DIGITAL PROJECTOR



VP6325

- 2000 ANSI lumens
- XGA resolution
- 3.5kg total weight
- DLP technology for high 2500:1 contrast
- 4000 hour lamp life
- 2 year lamp warranty for peace of mind

Rent* \$29.03/wk

S3312

\$2,759

ULTRA PORTABLE DIGITAL PROJECTOR



MP3135

- 1800 ANSI lumens
- XGA resolution
- 1.7kg total weight
- DLP technology for high 2000:1 contrast
- Unique HP space saving tower design
- 3 year projector warranty
- Carry bag included

Rent* \$37.70/wk

S5462

\$3,619

PORTABLE DIGITAL PROJECTOR



MP3222

- 2000 ANSI lumens
- XGA resolution
- 1.7kg total weight
- DLP technology for high 2000:1 contrast
- 3000 hour lamp life (eco mode)
- 3 year projector warranty
- Carry bag included

Rent* \$30.14/wk

P7947

\$2,869

DIGITAL WIRELESS PROJECTOR

Wireless connectivity to present powerpoint slides straight from a USB key.



MP3135W

- 1800 ANSI lumens
- XGA resolution
- 1.7kg total weight
- DLP technology for high 2000:1 contrast
- Present powerpoint straight from USB key
- Project wireless presentations (802.11b)
- Carry bag included

Rent* \$42.55/wk

S3308

\$4,169

These products are for delivery only. Delivery charges apply. See page 63 for details.

HP PROLIANT SERVER

HP PROLIANT ML110 G3

4 3.0GHZ SBS BUNDLE

cost effective solution to streamline your business. Ideal for 1-10 users.

PRODUCT FEATURES:

Intel® Pentium® 4 Processor 3.0GHz standard (supporting Hyper-Threading Technology). Multi Processor not supported

1GB PC3200 DDR SDRAM running at 400MHz, with unbuffered standard ECC capabilities (4GB maximum)

Integrated 1024-KB Level 2 ECC cache

Intel® E7221 Chipset

160GB 7,200 RPM SATA Non Hot Plug Drives

48x IDE (ATAPI) CD-ROM Drive

Intel® 82541PI PCI Gigabit NIC (embedded) 10/100/1000

WOL (Wake on LAN)

Windows Small Business Server - Standard Edition with 5

CALs (pre-installed OEM version)

Warranty: 3 year limited warranty

(3 year parts / 1 year labour / 1 year on-site)



Rent* \$19.04/wk

\$1,699

T0832

HP PROLIANT ML150 G2

great dual processor capable server, ideal for small business running sophisticated applications. Up to 25 users.

BOTH BUNDLES INCLUDE:

Intel® Xeon 3.0 GHz processors (dual processor capability)

2MB level 2 cache

Broadcom 5721 PCI-Express Gigabit NIC (embedded)

10/100/1000 WOL (Wake on LAN)

Single Channel Ultra320 SCSI Adapter in a PCI slot

(SCSI Models Storage Controller)

48x IDE (ATAPI) CD-ROM Drive

1.44-MB diskette drive

Form factor tower (5U)

Windows Small Business 2003 Standard + 5 CALs

(pre-installed)

TREND MICRO 12 months / 3 license security software

Warranty: 3 years limited warranty (3 years parts,

1 year labour & 1 year on-site)



Windows
Small Business Server 2003

3.0GHZ-2M/800 1GB 72GB SBS BUNDLE

1GB SDRAM(8GB Max)

72GB SCSI 10K Hot Plug U320 1" Drive (up to 6 supported)

Rent \$29.41/wk

T1537



\$2,795

X3.0/2MB 2GB 144GB SBS PREMIUM BUNDLE

• 2GB SDRAM(8GB Max)

• 2 x 72GB SCSI 10K Hot Plug U320 1" Drive (up to 6 supported)

Rent \$45.88/wk

T1528



\$4,495

HP PROLIANT ML350

G4T X3.0 SBS BUNDLE

Designed for all round ease of ownership and expandability. Up to 75 users.



ML350 Generation 4 with Microsoft Small Business Server Standard Edition + 5CALs

- 1 Intel Xeon (EM64T) 3.0GHZ Processor Dual Capable
- 2M Level 2 Cache
- 1GB Memory (8GB Max)
- NC7661 PCI Gigabit Nic
- 2 x 80GB SATA 7200 RPM
- 6 port SATA raid card
- Form factor tower 5U
- Trend Micro 12 months / 3 license security software
- 3 years limited warranty (3 years parts, 3 years labour & 3 years on-site)



Windows
Small Business Server 2003

Rent \$40.82/wk

T1540



\$3,999

*RENTSMART

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PLEASE NOTE:

All purchases subject to terms & conditions and returns policy. Delivery charges may apply. Not all items stocked in store but available for pick-up/delivery.

EXCLUSIVE SAMSUNG NOTEBOOK SPECIALS

M50

LIFESTYLE DESKTOP REPLACEMENT

The Samsung M50 is the world's lightest 17" notebook and at less than 3kg it's kind to your back. The perfect replacement for your existing computer and monitor, the M50 is a powerful business solution that's equipped with the latest Intel Pentium 760 Processor, 1GB memory and 128MB dedicated graphics card to run all your business applications. Work and play with the Samsung remote control to bring the cinema to your notebook.



- Intel Pentium M 760 2GHz Processor
- 1GB RAM
- 80GB* HDD
- 17" WXGA Gloss Display
- DVD SuperMulti Drive
- Wireless LAN 802.11b/g
- Nvidia GF Go 6600 128MB Graphics
- AVS now & Premium with remote control
- 5 in 1 media card reader
- Windows XP Professional
- 3 year on site warranty

Rent* \$35.41/wk

S6781

\$3,399

*RENTSMART

The figures quoted are based on a per week basis over 3 years. Terms and conditions apply.

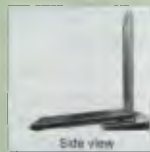
PLEASE NOTE:

All purchases subject to terms & conditions and returns policy. Delivery charges may apply. Not all items stocked in store but available for pick-up/delivery.

SAMSUNG X50 DOCKING SOLUTION PACK

The Samsung X50 15.4" wide gloss screen notebook, with the latest Intel Centrino technology, 128 megabyte graphics card and a 4 hour plus battery life, is the perfect solution for professionals on the go. Its tough and light weight magnesium alloy casing, at only 2.4kg, means the office goes where you go. The optional Samsung X Dock solution provides all your traditional legacy ports for your business needs, and DVI output for your high resolution applications.

- Intel Pentium M 740 1.7GHz Processor
- 512MB RAM
- 60GB* HDD (SATA)
- 15.4" WXGA Gloss Display
- DVD SuperMulti Drive
- ATI Mobility Radeon X700 128MB graphics
- Wireless LAN 802.11a/b/g
- Instant AV Station: Samsung media player without the need to boot Windows
- Weighs 2.4 kg
- Windows XP Professional
- 3 year on site warranty



Rent* \$28.83/wk

38538

\$2,699

SAMSUNG Q30+ BUNDLE - PERFECT FOR THE ROAD WARRIOR

The Samsung Q30+ is the ultimate fashion statement for the truly stylish professional. This sleek design at only 1.1kg means it'll be easy to show it off everywhere you go. Dress it up or go simple with an available array of mobile bonus accessories, two batteries, and external DVD writer, you only ever need to carry what you need. Good looks and brains to match, the Q30+ will be hard to put down!

- Intel Pentium M 753 1.2GHz ULV Processor
- 512MB RAM
- 60GB* HDD
- 12.1" WXGA Gloss Display
- External DVD SuperMulti Drive
- 2W Speakers SRS 3D sound
- Intel Extreme Graphics with 64MB of shared VRAM
- Wireless LAN 802.11b/g & Bluetooth
- Weighs 1.1kg
- Windows XP Professional
- 3 year on site warranty



Rent* \$35.41/wk

T0532

\$3,399

*Accessible capacity of hard drive may be less due to pre-installed software and recovery partition.

†Bonus offers only available while stocks last. Not available in conjunction with any other offer.

Value based on Harris Technology sell price as at 06/09/05 where applicable or on industry regular sell price.



EXCLUSIVE SAMSUNG NOTEBOOK SPECIALS

SAMSUNG X20 NOTEBOOK MOBILE PACK

The Samsung X20 series of notebooks delivers a light weight and stylish alternative for all your business needs. The X20 offers great value, with stylish magnesium alloy casing on a notebook series. These business machines are packed with the latest Intel Pentium M and Intel Celeron M processors, DVD burning capabilities, and supported by Samsung's renowned Next Business Day on site Warranty.

Intel Pentium M 740 1.7GHz Processor
256MB RAM
40GB" HDD
15" XGA LCD Display
DVD SuperMulti Dual Layer Drive
Wireless LAN 802.11a/b/g
Intel GMA 900 graphics
Weights 2.4kg
Up to 6 hours battery life
Windows XP Professional
12 months on site warranty

**BONUS
CARRY BAG
& 256MB RAM
(not installed)
Valued at
\$136!**



Image of RAM for illustration purposes only.

Rent* \$19.04/wk

T1765 Limited stock

\$1,699

SAMSUNG R50 MEDIA BUNDLE

The Samsung R series offers the perfect balance between performance and portability as a desktop replacement for your business or educational needs. With a dedicated ATI graphics card for added performance, and a glamorous 15.5" wide gloss screen with anti-reflective coating, your eyes will enjoy hours of entertainment. The R series is ideal for work or play.

Intel Pentium M 740 1.7Ghz Processor
512MB RAM
60GB" HDD
15.4" WXGA Gloss LCD Display
DVD SuperMulti Dual Layer Drive
ATI Radeon X300 64MB graphics
SRS 3D Surround sound and
AVS media player
5 in 1 media card reader
Wireless LAN 802.11a/b/g
Windows XP Professional
12 months on site warranty

**BONUS
CARRY BAG
& 512MB MP3
PLAYER
Valued at
\$209!**



Rent* \$23.30/wk

38704

\$2,079

Accessible capacity of hard drive may be less due to pre-installed software and recovery partition. Bonus offers only available while stocks last. Not available in conjunction with any other offer. Value based on Harris Technology sell price as at 06/09/05 where applicable or on industry regular sell price.

X20 MOBILITY & PERFORMANCE

The Perfect business partner for your success offering:

- Thinnest and lightest in its range
- Long battery life
- Solid magnesium alloy casing
- Instant AVS: unique Samsung Media Player without the need to boot up Windows

**GREAT
VALUE!**



- Intel Celeron M 370 1.5GHz Processor
- 512MB RAM
- 40GB" HDD
- 15" XGA LCD Display
- DVD SuperMulti Dual Layer Drive
- Wireless LAN 802.11b/g
- Intel GMA 900 graphics
- Weights 2.4kg
- Up to 6 hours of battery life
- Windows XP Professional
- 12 months on site warranty
- Limited stock

Rent* \$16.80/wk

35041

\$1,499



*RENTSMART

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PLEASE NOTE:

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MP3 Players

SAMSUNG MP3 PLAYERS

20GB MULTIMEDIA
PLAYER**YH-J70**

The YH-J70 is your multimedia jukebox, with capacity for 100 hours of video or 9,600 songs in WMA format (4,800 in MP3 format). It features a stunning 260,000 colour screen, games (including Tetris and Othello) and a G Sensor system to protect against hard drive damage.

S9198 BLACK

\$4591GB MOBILE
ALL-IN-ONE
ENTERTAINMENT PLAYER**YP-T8Z**

Samsung offers an all-in-one entertainment player that offers the ability to enjoy music, videos, photo albums, e-books, motion detecting games, USB host, mass storage and much more wrapped in a stylishly hip package.

S9197 BLACK

\$315**PLEASE NOTE:**

All purchases subject to terms & conditions and returns policy. Delivery charges may apply. Not all items stocked in store but available for pick-up/delivery.

SAMSUNG YP-U1 SERIES MP3 PLAYERS

Music just doesn't get more portable than this! The slim YP-U1 features a foldable USB plug, a 4 line LCD screen with 128 x 64 resolution allowing easy navigation and also functions as a mass storage device.

The rechargeable battery gives up to 13 hours playback time and can be used to record voice memos.

The YP-U1 is perfect for any on the go user who wants to carry both their files and music with them at all times.

FEATURES:

- Up to 1GB storage capacity
- USB 2.0 capability
- Voice recording
- Up to 13 hours playback time
- 4 line, multi-language LCD screen
- Supports MP3, WMA, WAV and Ogg files



S9199

256MB BLUE (YP-U1V)

\$115

S9200

512MB WHITE (YP-U1X)

\$145

S9201

1GB WHITE (YP-U1Z)

\$195

SAMSUNG YP-F1 SERIES MP3 PLAYERS

The YP-F1 with its fashionable design let's you wear the player as a necklace or just clip it anywhere on to your clothing. Change covers to be different, whenever you want to (Samsung provides three face plates included in standard packaging).

FEATURES:

- 512MB or 1GB storage capacity
- USB 2.0 capability
- FM radio & FM record
- Voice recording
- Up to 10 hours playback time
- Approximately 240 songs in WMA format or 120 songs in MP3 format (for 512MB model)
- Approximately 480 songs in WMA format or 240 songs in MP3 format (for 1GB model)



S9194

512MB (YP-F1X)

\$175

S9195

1GB (YP-F1Z)

\$225



VISUAL DISPLAY OF CHOICE

17" LCD MONITOR



940N - ANALOGUE

Response time: 8ms
Maximum resolution: 1280 x 1024
Contrast ratio: 600:1
Interface: Analogue
Ultra narrow screen bezel
3 year on site exchange[^]

S9509 BLACK **\$379¹**

S9511 SILVER **\$379¹**

19" LCD MONITOR



940B - ANALOGUE/DIGITAL

- Response time: 8ms
- Maximum resolution: 1280 x 1024
- Contrast ratio: 700:1
- Interface: analogue / digital
- Height Adjust and Pivot stand
- 3 year on site exchange and zero dead pixel policy[^]



Rent* \$6.71/wk

S8306 SILVER **\$599**

Rent* \$6.71/wk

S8307 BLACK **\$599**

19" WIDESCREEN LCD MONITOR



940MW - ANALOGUE/DIGITAL

Response time: 8ms
Maximum resolution: 1440 x 900
Contrast ratio: 700:1
Analogue / Digital interface with multiple inputs
Wide format viewing with HDTV Ready
Built in TV tuner and multimedia speakers
3 year on site exchange and zero dead pixel policy[^]

Rent* \$8.95/wk

T3189 **\$799**

20.1" LCD MONITOR



204Ts - ANALOGUE/DIGITAL

- Response Time: 16 ms
- Height Adjust and Pivot stand
- Maximum resolution: 1600 x 1200
- Contrast ratio: 700:1
- Interface: Analogue / Digital
- Video inputs with picture in picture
- 3 year on site exchange and zero dead pixel policy[^]



Rent* \$12.31/wk

S9370 **\$1,099**

WHY SAMSUNG...?



MagicTune™

Included with all Samsung LCD screen's is Samsung's MagicTune™ software. MagicTune™ allows a user to quickly and easily make display adjustments using their mouse rather than through an onscreen menu. MagicTune™ features include colour calibration, brightness/contrast, geometry adjustment and remote asset management.



MagicSpeed

Samsung provides a range of fast response LCD monitors (4ms/6ms/8ms) many of which incorporate the patented Samsung RTA chip (Response Time Accelerator) designed for gaming and video playback.



MagicColor

Samsung MagicColor will automatically optimise the colours onscreen depending on the content - works great with games, business graphics and displaying accurate skin tones in photos.



MagicBright

Samsung MagicBright provides different brightness levels depending on the application - settings include Text, Internet, Entertain and User Adjust.

*RENTSMART

The figures quoted are based on a per week basis over 3 years. Terms and conditions apply.

PLEASE NOTE:

All purchases subject to terms & conditions and returns policy. Delivery charges may apply. Not all items stocked in store but available for pick-up/delivery.

[^]Please contact Samsung Electronics Australia on 1300 362 603 or email: monitor.service@samsung.com for full Terms & Conditions. ¹Only available while stocks last.

VAIO NOTEBOOKS

SONY NOTEBOOKS

**VGNTX17GPB**

The latest TX17GP redefines mobility! Besides the impressive specifications, the new TX17GP features a robust carbon fiber chassis that's resistant to bumps and knocks. Essential for business travellers who carry their notebooks everywhere. Carbon fibre is as strong as steel yet much lighter.

- Carbon Fibre Chassis
- Built in DVD±RW Dual Layer Drive
- 11.1" Wide XGA Clear Bright LCD
- Pentium M ULV 753 1.2GHz
- 512MB RAM
- 60GB HDD*
- WiFi and Bluetooth 2.0+EDR
- Weighs 1.24kg
- Instant AV
- Windows XP Pro



34968 **Rent* \$39.57/wk**
\$3,799

***RENTSMART**

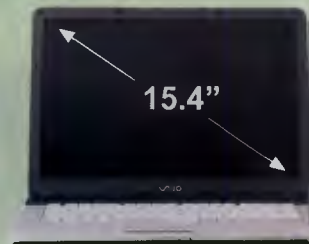
The figures quoted are based on a per week basis over 3 years. Terms and conditions apply.

PLEASE NOTE:

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FS SERIES

The FS exudes style & quality in every way. Its sleek lines and thin frame inspire and encourage creativity and imagination. With a dazzling 15.4" Clear Bright widescreen display and comfy full sized keyboard, this is a machine you will have no problems working all day on.

**VGNF35GP**

- Magnesium alloy chassis
- DVD±RW Dual Layer Drive
- 15.4" Wide XGA Clear Bright LCD
- Pentium M 750 1.8GHz
- 512MB RAM
- 60GB HDD*
- 128MB nVidia Go 6400 graphics
- Wireless LAN 802.11b/g
- Windows XP Pro

Rent* \$24.56/wk

34953

\$2,299

FJ SERIES

**VGNFJ58GP**

- DVD±RW Dual Layer Drive
- 14.1" XGA Clear Bright LCD
- Pentium M 740 1.7GHz
- 512MB RAM
- 60GB HDD*
- Intel GMA 900 graphics
- Wireless LAN 802.11b/g
- Windows XP Pro

Rent* \$22.40/wk

T3720

\$1,999

S SERIES

**VGNS56GPS**

- Magnesium alloy chassis
- DVD±RW Dual Layer Drive
- 13.3" Wide XGA Clear Bright LCD
- Pentium M 770 1.8GHz
- 512MB RAM
- 60GB HDD*
- 128MB nVidia Go 6400 graphics
- WiFi & Bluetooth 2.0+EDR
- Windows XP Pro

Rent* \$31.55/wk

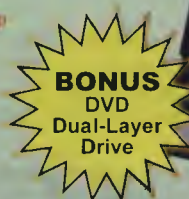
34961

\$2,999

BUSINESS PRO SERIES

VGNBX168GP

- Magnesium alloy chassis
- 15.4" Wide XGA Clear Bright LCD
- Pentium M 2GHz
- 512MB RAM & 60GB HDD*
- WiFi and Bluetooth 2.0+EDR
- Interchangeable optical drives
- Optional Docking Station includes a hot-swappable drive bay and battery charger slot
- Extensive security options: Biometric Fingerprint Sensor, Power on password, Hard Disk password, TPM Security Chip.
- Windows XP Professional



Rent* \$31.55/wk

93097

\$2,999

*Accessible capacity of hard drive may be less due to pre-installed software and recovery partition.

SONY®

CAPTURE, BURN & DISPLAY WITH SONY

LCD PROJECTORS



BRIGHT IMAGES

GENTLE ON THE EYES

NATURAL COLOURS

ULTRA PORTABLE PROJECTOR



**WEIGHS
ONLY
1.9KG**

VPLCS20 model featured

- 2000 ANSI Lumens
- Slim (52mm) and stylish design
- Advanced intelligent auto set-up
- Multiple inputs
- Power zoom & focus
- Large screen viewing up to 300"
- Security password authentication system
- Remote control & carry case supplied
- 2 years limited warranty

VPLCS20 - SVGA resolution Rent* \$20.16/wk

S7484 **\$1,799**

VPLCX20 - XGA resolution Rent* \$25.95/wk

S7487 **\$2,429**

WIRELESS MEMORY STICK PROJECTOR



- 2500 ANSI Lumens
- XGA (1024 x 768) resolution
- Advanced intelligent auto set-up
- Short focus lens
- AirShot II wireless connection
- Memory stick slot for presentation without a PC
- Large screen viewing up to 300"
- Security password authentication system
- Remote control & carry case supplied
- 2 years limited warranty

HD READY

VPLCX76 - XGA resolution Rent* \$39.57/wk

S6905 **\$3,799**

DIGITAL STILL CAMERAS

Features:

- Carl Zeiss Lens
- 3x Optical Zoom, 6x Digital Zoom
- Battery and Charger supplied
- Pictbridge compatible
- MPEG Movie VX with audio
- Ultra fast Real-Image processor

DSCW55

DSC755

DSCP200S



- 5.1 megapixel
- 2.5" colour LCD
- ISO sensitivity settings

- 5.1 Megapixel
- Large 2.5" colour LCD
- Ultra Slim Credit Card Style

- 7.2 megapixel
- 2.0" colour LCD
- Aluminium Chassis

Rent* \$6.71/wk

R8761 **\$485**

S9238 **\$529**

S1360 **\$599**

DELIVERY ONLY These products are for delivery only. Delivery charges apply. See page 63 for details.

DVD±RW DUAL LAYER BURNERS

- Ultra-fast 16x max Double Layer / Dual Format ± DVD Burner
- Preserve home movies on DVD
- Back up your computer, make music discs, and more....

SONY INTERNAL DUAL LAYER 16X DVD BURNER



DRU810A

- Internal, easy to install EIDE/ATAPI Interface
- Replaceable black front faceplate included
- Bundled with NERO software suite

T3331 **\$125**

SONY EXTERNAL DUAL LAYER 16X DVD BURNER



**MAC
SOFTWARE
SUPPLIED**

DRX810UL

- USB2.0 & i.LINK / Firewire connection
- Can be operated in a vertical or horizontal orientation
- Bundled with NERO software suite & Toast 6 Lite for Mac

T3332 **\$245**

*RENTSMART

The figures quoted are based on a per week basis over 3 years. Terms and conditions apply.

PLEASE NOTE:

All purchases subject to terms & conditions and returns policy. Delivery charges may apply. Not all items stocked in store but available for pick-up/delivery.

TOSHIBA

LEADER IN NOTEBOOK TECHNOLOGY

HUGE RANGE TOSHIBA PROJECTORS

Choosing the right projector for your needs is easy with the range of **Toshiba Portable Projectors** available at Harris Technology.

Designed with simplicity in mind, a Toshiba projector is a **lightweight, compact solution** that is quick and easy to set up, so that you can take it anywhere, anytime.

With the option of **wireless connectivity** and a host of easy to use features, you can trust there is a Toshiba projector available that will add a new dimension to your next presentation.

TOSHIBA'S QUALITY ASSURANCE WARRANTY

- Standard 3 year warranty
- 90 day new product replacement
- 90 day lamp replacement

See **page 16** for the latest projector offers by Toshiba.

Call, Click or Visit to find out more on the Toshiba range of projectors available at Harris Technology.

*RENTSMART

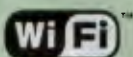
The figures quoted are based on a per week basis over 3 years. Terms and conditions apply.

PLEASE NOTE:

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SATELLITE PRO L20

The Satellite Pro L20 is a reliable, cost effective desktop replacement notebook that eases your entry into the world of mobile computing. Offering a choice of the latest Intel Centrino mobile technology, including the Pentium M processor for exceptional mobile performance or the Celeron M processor for the perfect balance between mobile processing technology and exceptional value.



BOTH MODELS INCLUDE (unless otherwise stated):

256MB DDRII RAM, 40GB hard drive#, 15" XGA screen, WiFi b/g, MS OneNote



L20

- Celeron M 360 1.4GHz
- DVD/CD-RW Combo Drive
- Windows XP Home



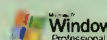
Rent \$12.87/wk

S9748

\$1,149

L20

- Pentium M 740 1.7GHz
- DVD SuperMulti + Double Layer Drive
- Windows XP Professional



Rent \$18.48/wk

S9669

\$1,649

PORTÉGÉ & LIBRETTO SERIES COMPACT AND LIGHT

Ready to work when and where you are, the Portégé & Libretto series delivers an advanced combination of ultra portability and expansion capability. Behind the compact design lies a power base ready to maximise performance with Intel Pentium M processors, large memory, and built in wireless communication to keep you well connected.



R200

LIBRETTO U100

- Pentium M 753 1.2GHz ULV
- 512MB RAM
- 7.2" WXGA TFT display
- DVD SuperMulti Dual Layer (with Dock)
- Weight: from 791g
- WiFi b/g
- 1 year warranty

PORTÉGÉ R200

- Pentium M 753 1.2GHz ULV
- 12.1" XGA TFT display
- No optical drive
- Up to 5 hrs battery life
- Weight: from 1.3kg

PORTÉGÉ M300

- Pentium M 753 1.2GHz ULV
- 768MB RAM
- 80GB hard drive#
- 12.1" SXGA+ TFT display
- DVD SuperMulti Drive
- Weight: from 2kg

PORTÉGÉ TABLET M200

- Pentium M 750 1.8GHz
- 512MB RAM
- 80GB hard drive#
- 12.1" SXGA+ TFT display
- No optical drive
- Weight: from 2.1kg
- XP Professional Tablet
- Limited Stock

ALL MODELS INCLUDE (unless otherwise stated):

2x256MB RAM, 60GB hard drive#, 56K V.90 & 10/100 LAN, WiFi a/b/g, Bluetooth, 3 year warranty & Windows XP Professional

Rent* \$34.89/wk

E5927

\$3,349

Rent* \$35.41/wk

S9625

\$3,399

Rent* \$37.49/wk

T3291

\$3,599

Rent* \$39.80/wk

S6940

\$3,899

*Accessible capacity of hard drive may be less due to pre-installed software and recovery partition.

TOSHIBA

harris technology



Notebooks

LEADER IN NOTEBOOK TECHNOLOGY

TECRA A3X SPECIAL

The Tecra A3X is an entry level, corporate notebook, offering outstanding quality and superior mobile performance, all at a compelling price. Its rich blend of features, makes it a truly capable and cost effective desktop replacement solution for the mobile business user. Featuring the NEW DVD SuperMulti Double Layer that supports recordable DVDs featuring two separate recording layers that can store 8.5GB of data.



Pre-order NOW for mid January delivery. Delivery charges apply.



- Intel Pentium M 740 1.7GHz processor
- 512MB DDRII RAM
- 60GB[#] hard drive
- 15" XGA TFT screen
- DVD SuperMulti double layer drive
- 56k V.92 modem & LAN

- Wireless LAN 802.11a/b/g Wi-Fi
- PCMCIA: 1 x Type II
- Weight: 2.7kg
- Battery life up to 4 hours
- Microsoft XP Professional
- 1 year warranty

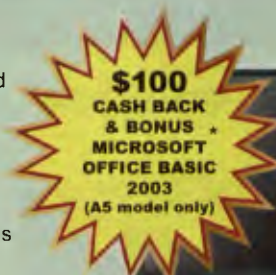
Rent \$19.04/wk

S9161 LIMITED STOCK AVAILABLE

\$1,699

TECRA A4 & A5

The Tecra A4 and A5 widescreen notebooks have been designed for small to medium businesses looking for the latest widescreen desktop replacement technology at an affordable price. The stunning array performance features includes advanced docking capabilities, easy connectivity options and choice of either 15.4" widescreen or 14" widescreen. The larger display capacity allowing users to view and edit large documents, and watch DVDs with full detail on the optimum screen size. The A4 and A5 offer low initial cost and no compromise on renowned Toshiba quality.



TECRA A5

- A4**
- Pentium M 760 2GHz
 - 15.4" WSXGA+ TFT screen
 - 80GB hard drive[#]
 - 128MB dedicated video RAM
 - Wi-Fi a/b/g Wireless LAN & Bluetooth

- A5¹**
- Pentium M 740 1.7GHz
 - 14" WXGA TFT screen
 - 60GB hard drive[#]
 - Up to 128MB shared video RAM
 - Wi-Fi a/b/g Wireless LAN

BOTH MODELS INCLUDE (unless otherwise stated):
512MB RAM, DVD SuperMulti Double Layer, 1 year warranty & Windows XP Professional

Rent* \$28.51/wk

Limited stock

Rent* \$22.07/wk

T0916

\$2,669

C9268¹

\$1,969

¹ Cashback available via redemption from Toshiba. Standard postage fees and conditions apply.

See www.isd.toshiba.com.au/cashback for details.

[#] Accessible capacity of hard drive may be less due to pre-installed software and recovery partition.



SATELLITE M60

POWERFUL, MULTIMEDIA PC

The Satellite M60 is a powerful multimedia business machine with a 17" widescreen, the latest Intel Centrino mobile technology, and 80GB hard drive[#] storage capacity. It delivers a spectacular technology and entertainment experience, with built in tri-mode Wireless LAN 802.11a/b/g for greater mobility. The M60 appeals to design oriented professionals wanting a way to manage graphic, sound and digital content.



- Pentium M 750 1.8GHz
- 17" WSXGA+ CSV screen
- 512MB DDRII RAM
- 80GB hard drive[#]
- DVD SuperMulti +DL
- 128MB dedicated video RAM
- Wi-Fi a/b/g & Bluetooth
- Microsoft Windows XP Professional

Rent* \$33.66/wk

T3161

\$3,199

*RENTSMART

The figures quoted are based on a per week basis over 3 years. Terms and conditions apply.

PLEASE NOTE:

All purchases subject to terms & conditions and returns policy. Delivery charges may apply. Not all items stocked in store but available for pick-up/delivery.

PROJECTORS

2C PRESENT-IT PORTABLE
FREE STANDING PROJECTOR
SCREEN

FEATURES:

- Black folded steel casing incorporating tripod legs.
- Pull up with adjustable height pole Included.
- Free standing on floor
- Maximum image size: 1720 x 1720mm
- Multi aspect ratio.

S8066 96" screen

\$5392C SEE-IT PULL DOWN
WALL / CEILING SCREEN

FEATURES:

- Manual pull down with white borderless screen.
- Matte black case colour
- Ceiling or wall mountable.
- Multi Aspect Ratio.

S8072 84" screen

\$299

S8073 100" screen

\$399

*RENTSMART

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PLEASE NOTE:

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POWERFUL MICRO PORTABLE PROJECTOR

The Toshiba TDP-P8 produces bright, crisp detailed images all from a tiny chassis weighing a mere 1.0kg. Featuring XGA resolution, a high contrast ratio of 2100:1 and easy set up functions the TDP-P8 is the perfect portable projector solution.

*It's a must have for any
'on-the-move' professional.*

KEY FEATURES:

- **XGA resolution**
- **Ultra portable: only 1.0kg**
- **High contrast ratio: 2100:1**
- Impressive brightness: 1500ANSI lumens
- Auto-Image setup
- Digital keystone correction
- Includes mouse remote with laser
- Freeze function
- Eco mode: reduces the operating noise and expands the lamp life

NEW EXCLUSIVE

2100:1 Ratio • Only 1kg



XGA

Rent* \$26.70/wk

T3878

INTRODUCTORY OFFER¹**\$2,499**

TDP-S25 SVGA PROJECTOR



TDP-T40 XGA PROJECTOR



The S25 projector is a compact and affordable multipurpose projector with SVGA resolution. Utilising the latest DLP technology, the S25 generates outstanding colour reproduction and features a high contrast ratio of 2000:1. Easy set-up with simple 'plug-and-play' functionality ensures that you will be up and running in no time at all. This portable projector has an image brightness of 1800 ANSI-Lumens and delivers crystal clear images, even in day lit rooms. The perfect choice for anyone on a budget including education environments, small businesses or even the home office/cinema.

Rent* \$14.89/wk

R9555

\$1,329

Deliver powerful presentations with a clear, sharp & high resolution T40 Projector. DLP technology enables the T40 to project at an exceptionally bright 1800 ANSI-Lumens which ensures excellent image quality, even in poor lighting conditions. With XGA (1024x768) resolution and a contrast ratio of 2000:1, this is the ideal projector series for standard business presentations and the obvious choice when you need to present detailed information or intricate office documents. Weighing only 3.0kg, this is a highly portable solution to take with you anywhere.

Rent* \$21.06/wk

S3218

\$1,879

¹ Introductory offer only valid on purchases made between 1/01/2006 til 31/01/2006. Not valid with any other offer or promotion.

Desktops & Displays

Desktops & Displays

HOT XGA PROJECTOR OFFER

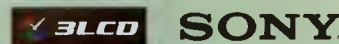
SONY LCD DATA PROJECTOR

The VPL-EX1 is a high-quality portable projector, easy on the shoulders and ready to 'do its thing' when you are.

With a stylish design, the VPL-EX1 comes with a full range of features - including superb brightness levels, USB compatibility, 4-times digital zoom and intelligent auto set-up - making this projector an excellent solution for all your professional presentation needs.

FEATURES:

- Superb Brightness: 1500 ANSI lumens
- XGA Resolution
- 4X Digital Zoom
- Intelligent Auto Setup
- Smart APA (Auto Pixel Alignment)
- Multiple Inputs including USB compatibility



- Remote Control Convenience
- Powered Tilt Adjuster & Auto Digital Keystone Correction
- Powered lens protector
- Password Security for theft deterrence
- Highly portable compact unit: 2.7kg

Rent* \$20.05/wk

\$1,789

J9934

LEADTEK QUADRO DUAL HEAD PCIE WORKSTATION GRAPHICS



FX540 pictured



- NVIDIA Quadro deliver the industry's highest performance and feature rich 2D multi-monitor graphics
- Support for multiple displays (various configurations of VGA and DVI-I) - enhanced multi-display productivity is powered by dual RAMDACs and NVIDIA's patented nView multi-display software
- NVIDIA Unified Driver Architecture - enables ease of use in administering and maintaining networks of graphics workstations

SAMSUNG 730BF / 930BF LCD MONITOR



- Response time: 4ms (Grey to Grey)
- Maximum resolution: 1280 x 1024
- Contrast ratio (730BF model): 600:1
- Contrast ratio (930BF model): 700:1
- Interface: Analogue / Digital
- Stylish design made for entertainment
- Black with silver trim
- 3 year on site exchange & zero dead pixel policy*

P2076 280NVS 64MB **\$259**

S6830 17" - 730BF **\$499**

Rent* \$7.83/wk

S9584 FX540 128MB **\$399**

S6833 19" - 930BF **\$699**

*Accessible capacity of hard drive may be less due to pre-installed software and recovery partition. Up to 5GB used for recovery partition may be unavailable. Recovery discs not included with some brands of notebooks and desktops

HP DX5150 SMALL FORM FACTOR



Image for illustration purposes only

The HP dx5150 Business PC features an AMD Athlon™ 64 processor, ATI RADEON® XPRESS 200 chipset with built-in graphics, and AMD Cool'n'Quiet™ technology which reduces processor power consumption and fan noise. Additional support for 64-bit processors and standard DVI-D port provides an easy upgrade path to next-generation software and hardware.

DX5150

- AMD Athlon™ 64 Processor Model 3000+
- 256MB memory
- 80GB* SerialATA (7200RPM) Hard Disk Drive
- Combo optical drive
- Microsoft Windows XP Home
- 3 years parts / 1 year labour warranty



Rent* \$10.41/wk

T0705

\$929

*RENTSMART

The figures quoted are based on a per week basis over 3 years. Terms and conditions apply.

PLEASE NOTE:

All purchases subject to terms & conditions and returns policy. Delivery charges may apply. Not all items stocked in store but available for pick-up/delivery.

HIGH PERFORMANCE COMPUTING AT AN AFFORDABLE PRICE

ACER 17" LCD MONITOR



AL1716ES - Analogue

- Maximum resolution: 1280 x 1024 @ 75 Hz
- Response time: 12ms
- Contrast ratio: 500:1

T3247

\$369

ACER 19" LCD MONITOR



AL1912BM - Analogue

- Maximum resolution: 1280 x 1024 @ 75 Hz
- Response time: 16ms
- Integrated speakers

T3248

\$499***RENTSMART**

The figures quoted are based on a per week basis over 3 years. Terms and conditions apply.

PLEASE NOTE:

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**HOT PC DEALS**

AcerPower F5 PC's come packed with the latest technologies making them the perfect choice for multimedia applications!



Image for illustration purposes only

AcerPower F5 PENTIUM 4 PC

- **Processor:** Intel Pentium 4 3.06GHz (1MB Cache, 800MHz)
- **Memory:** 1024MB DDR2-SDRAM
- **Hard Drive:** 160GB* (7200RPM) SATA
- **Optical Drive:** Dual Layer 16x DVD Writer



- Speakers included
- Keyboard & mouse included
- **Operating system:** Windows XP Professional
- **Warranty:** 1 year onsite

Rent* \$11.19/

T3142

\$999**AcerPower F5 CELERON PC**

- **Processor:** Intel Celeron D335, 2.8GHz (256KB Cache, 533MHz)
- **Memory:** 512MB DDR2-SDRAM
- **Hard Drive:** 80GB* (7200RPM) SATA
- **Optical Drive:** Combo DVD/CD-RW
- Speakers included
- Keyboard & mouse included
- **Operating system:** Windows XP Professional
- **Warranty:** 1 year onsite



BONUS
LEXMARK
Z611
PRINTER¹

Image for illustration purposes only

Rent* \$8.95/

T3141

\$799

*Accessible capacity of hard drive may be less due to pre-installed software and recovery partition.

¹Bonus Lexmark Z611 printer offer only available with the AcerPower F5 Celeron PC.

HOT ACER NOTEBOOKS DEALS

TRAVELMATE 2413WLCi WITH WIDESCREEN

The TravelMate 2413 is the perfect partner for enhancing your efficiency and success with its combination of robust processing power, graphics capabilities, communications and dependable design.

Intel Celeron M 370 1.5GHz
256MB DDRII RAM
15.4" WXGA wide screen
60GB hard disk#
DVD/CD-RW combo drive
4 x USB 2.0 ports
Modem / LAN
WiFi 802.11g with SignalUp Technology
Windows XP Professional



Rent* \$12.31/wk

\$1,099

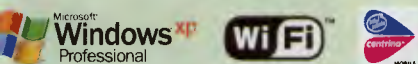
T0766

NEW EXCLUSIVE!

TRAVELMATE 4062WLMi WITH WIDESCREEN

Work with freedom and experience the brand new approach to productivity! The new TravelMate 4062 combines Intel Centrino technology featuring a comprehensive feature set to offer one of the most practical notebooks available today.

Intel Pentium M 740 1.7GHz
256MB DDRII RAM
15.4" WXGA wide screen
60GB hard disk#
DVD±RW Dual Layer Drive
56Kbps modem
10/100 LAN
WiFi 802.11g with SignalUp Technology
Up to 5 hours of battery life
Windows XP Professional



Rent* \$19.04/wk

\$1,699

T3774



BOOST YOUR WIRELESS CONNECTION WITH ACER SIGNALUP

A breakthrough that boosts wireless performance by a minimum of 25%. Acer technology provides a more stable signal with higher quality wireless both outdoors and in difficult indoor environments.

Accessible capacity of hard drive may be less due to pre-installed software and recovery partition.

TRAVELMATE 4064WLMi

POWERFUL AND FEATURE PACKED!



Image for illustration purposes only

The TravelMate 4064 combines comprehensive connectivity with an excellent array of features to produce a superbly effective mobile computing solution – for top-class value.

- Intel Pentium M 760 2GHz
- 2 x 512MB DDRII RAM
- 15.4" WXGA wide screen
- 100GB hard disk#
- DVD±RW Dual Layer Drive
- 3 x USB 2.0, Firewire, S-Video out
- Modem / LAN
- WiFi 802.11g with SignalUp Technology
- Up to 5 hours of battery life
- Windows XP Professional



Rent* \$22.40/wk

\$1,999

T3716

*RENTSMART

The figures quoted are based on a per week basis over 3 years. Terms and conditions apply.

PLEASE NOTE:

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LEADERS IN VISUAL DISPLAY TECHNOLOGY

42" PLASMA DISPLAY



(Stand not included)

NEC's award winning 42" Plasma can reproduce 68.7 billion colours making it the ideal home theatre screen. With a built in amplifier, and an extraordinary amount of inputs for data and video (including Component, Composite, RGB, DVI-D, BNC, S-Video and RS232) this NEC plasma is standard or high definition compatible and available in either black or silver.

KEY FEATURES:

- 42" VGA plasma
- Can reproduce 68.7 billion colours
- 853 x 480 Pixel resolution
- HD Compatible
- Stylish design, only 28.5kg
- 3 year limited warranty



Q1878 Silver Rent* \$31.55/wk
\$2,999

OPTIONAL EXTRAS:

T3510 **\$319**
Wall Mount

M5489 **\$349**
Stand

H1775 **\$419**
Twin Speakers

* Black plasma and accessory parts are available upon request.

*RENTSMART

The figures quoted are based on a per week basis over 3 years. Terms and conditions apply.

PLEASE NOTE:

All purchases subject to terms & conditions and returns policy. Delivery charges may apply. Not all items stocked in store but available for pick-up/delivery.

SVGA PORTABLE LCD PROJECTOR

**NEW**

VT-48G

- 1600 ANSI Lumens
- SVGA resolution
- Contrast ratio: 600:1
- Lamp life 3000 hours
- Integrated speaker
- Wall colour correction
- Quietness: 32 dB
- Compact 2.8kg
- Warranty: 2 years on parts

Rent* \$12.43/wk

T3233 Silver **\$1,109**

17" ANALOGUE/DIGITAL LCD MONITOR



MULTISYNC LCD1770NX

- Native resolution: 1280 x 1024
- Response time: 12ms
- Contrast ratio: 500:1
- Stylish design with silver trim
- Height adjustable stand
- IF Global Award Winner
- Warranty: 3 years limited warranty on parts and labour

Q6941 White **\$439**Q6942 Black **\$439**

SVGA PORTABLE LCD PROJECTOR

**NEW**

VT-480G

- 2000 ANSI Lumens
- SVGA resolution
- Contrast ratio: 600:1
- Lamp life 2000 hours
- Integrated speaker
- Security function
- Quietness: 35 dB
- Compact 2.9kg
- Warranty: 2 years on parts

Rent* \$17.81/wk

T3738 Silver **\$1,589**

19" ANALOGUE/DIGITAL LCD MONITOR



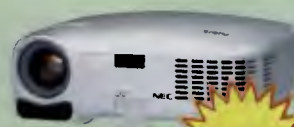
MULTISYNC LCD1980FXI

- Native resolution: 1280 x 1024
- Response time: 18ms
- Contrast ratio: 600:1
- Analogue and Digital Inputs
- Height adjustable stand
- XtraView wide-angle viewing
- Warranty: 3 years limited warranty on parts and labour

Rent* \$11.60/wk

S7448 White **\$1,035**S7437 Black **\$1,035**

XGA PORTABLE DLP PROJECTOR

**NEW**

LT-35G

- 3000 ANSI Lumens
- XGA resolution
- Contrast ratio: 600:1
- Lamp life 2000 hours
- Integrated speaker
- Auto focus function
- Direct power off function
- Ultra Compact 2.0kg
- Warranty: 2 years on parts

Rent* \$34.39/wk

T3740 Silver **\$3,269**

21" ANALOGUE/DIGITAL LCD MONITOR



Image for illustration purpose only

MULTISYNC LCD2170NX

- Native resolution: 1600 x 1200
- Response time: 20ms
- Contrast ratio: 500:1
- Stylish design with silver trim
- Height adjustable stand
- XtraView wide-angle viewing
- Warranty: 3 years limited warranty on parts and labour

Rent* \$21.06/wk

S9165 White **\$1,879**S9167 Black **\$1,879**

These products are for delivery only. Delivery charges apply. See page 63 for details.

WORK, PLAY AND COMMUNICATE IN THE DIGITAL WORLD

LOGITECH CORDLESS DESKTOP EX 110



The Cordless Desktop® EX 110 makes it incredibly easy and affordable to go cordless-in style. Quick, simple to set up, and completely reliable. Enjoy the freedom and precision of an 800 dpi optical mouse, plus one-touch controls that make music, Internet, and other frequent functions simpler. Superb quality and value.

S8949

\$65

LOGITECH CORDLESS DESKTOP MX 5000 BLUETOOTH LASER

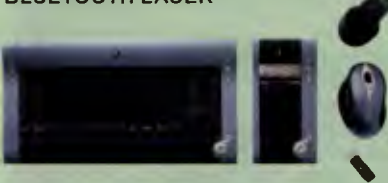


The Cordless Desktop® MX 5000 Laser is the world's first smart desktop. A unique LCD keyboard display lets you instantly navigate media playlists or online radio stations, view time/date, and more. You'll also enjoy smart power management, including rechargeable Laser mouse, advanced Bluetooth wireless capabilities, and awesome touch-sensitive media controls.

T3579

\$247

LOGITECH DINOVO MEDIA DESKTOP BLUETOOTH LASER



The diNovo Media Desktop™ is the most advanced desktop in today's digital world. It includes an award-winning ultra-flat keyboard, and a matching MediaPad™ that enables remote control playback of music or images on your PC. Bluetooth 2.0 creates advanced wireless capabilities, while a comfortable, rechargeable MX Laser mouse delivers stunningly precise performance.

T3582

\$320

V270 CORDLESS NOTEBOOK MOUSE BLUETOOTH



The Logitech V270 Cordless Optical Notebook Mouse for Bluetooth works without a receiver for the ultimate in hassle-free mobility. Connects instantly to your Bluetooth-enabled notebook, providing up to 30 feet of cordless range. Power-saving modes, battery indicator light, incredibly smooth tracking and an on/off switch manage power wisely.

T3577

\$74

V200 CORDLESS NOTEBOOK MOUSE



Maximise productivity, minimise downtime. Compact, with up to 1 year of battery life, the Logitech V200 Cordless Notebook Mouse guarantees comfort and reliable performance on the road. With 2.4 GHz cordless technology providing interference-free operation, a storable micro-receiver for easy transport, Invisible Light™ optical tracking and tilt wheel plus zoom, V200 is ideal for travel.

S3296 SILVER

\$65

S3300 BLACK

\$65

LX-5 CORDLESS OPTICAL MOUSE



Cordless Freedom™ made easy. The Logitech LX5 Cordless Optical Mouse installs effortlessly and features smart power management for up to 8 months of battery life - or more if you use the on/off button. Tilt wheel plus zoom is perfect for viewing digital photos and spreadsheets. Battery indicator light. USB and PS/2. 5-year warranty.

S8953

\$45

QUICKCAM PRO 5000

The Logitech QuickCam Pro 5000's exclusive technologies ensure sharp video and clear audio. Logitech RightLight™ technology provides optimum video even in dim lighting while RightSound™ technology eliminates annoying echo and allows natural conversations.

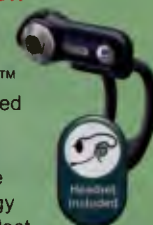


T3585

\$139

QUICKCAM FUSION

1.3 mega-pixel sensor quality with Logitech RightLight™ Technology combined with a high quality audio via a built-in microphone & noise reduction technology for hands free/headset free VideoCalling.



T3586

\$157

INTERNET CHAT HEADSET

Perfect for internet chat, multi-player gaming or music listening, Logitech's Internet Chat Headset has a noise cancelling microphone and four interchangeable, coloured covers. Adjustable headset volume, microphone mute control and 2.5m cable for extended movement.



H8683

\$35

PREMIUM USB HEADSET 350

This convenient headset features soft touch in-line volume and mute controls. Its noise cancelling microphone improves performance, while the plush ear pads and premium headband enhance comfort.



R7934

\$69

PLEASE NOTE:

All purchases subject to terms & conditions and returns policy. Delivery charges may apply. Not all items stocked in store but available for pick-up/delivery

HP POCKET PC's & SMARTPHONE

HP iPAQ h6365 POCKET PC & GSM/GPRS SMARTPHONE



- **Processor:** TI OMAP 1510
- **Main memory:** 64MB RAM (20MB iPAQ file store)
- **Display:** 240 x 320 TFT touch screen
- **Audio:** built in with 3.5mm jack
- **Camera:** VGA 640 x 480
- **Input device:** stylus
- **Expansion:** SD/MMCard Slot with SDIO
- **Communication:** integrated GSM/GPRS, 802.11b Wi-Fi, bluetooth, infrared, USB cable
- **Dimensions:** 119 x 75 x 18mm
- **Weight:** 190g
- **Battery:** 1800mAh Lithium-Ion
- Microsoft Windows Mobile 2003 - phone edition
- **Warranty:** 1 year manufacturer's parts and labour

Rent* \$10.63/wk

Q2078

\$949***RENTSMART**

The figures quoted are based on a per week basis over 3 years. Terms and conditions apply.

PLEASE NOTE:

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HP iPAQ hw6515 MOBILE MESSENGER

Taking global communication to new places

The sleek HP iPAQ hw6500 Mobile Messenger is a global communications device giving you the best in connectivity, productivity, and mobility with high end features such as support for GSM/GPRS networks, GPS Navigation and multiple messaging capabilities.

- **Processor:** Intel XScale 312 MHz
- **Main Memory:** 64MB RAM (12MB iPAQ File Store)
- **Display:** 240 x 240 TFT touch screen
- **Audio:** built in with 2.5mm jack
- **Camera:** Built-in SXGA, HP Photosmart 1.3 MP, 1280 x 1024 resolution
- **Input Device:** stylus
- **Expansion:** Integrated SD and mini SD slot
- **Communication:** Integrated quad band GSM/GPRS/EDGE, Bluetooth, IrDA
- **Dimensions:** 118 x 71 x 21mm
- **Weight:** 165g
- **Battery:** 1200mAh Lithium-Ion
- Microsoft Windows Mobile 2003 - phone edition
- **Warranty:** 1 year manufacturer's parts and labour



Rent* \$11.19/wk

C5205

\$999

HP POCKET PC's

The slim and sleek HP iPAQ series Pocket PC's make it easy to be productive at work, at home, or on the go.

Whether you are at the beach or just stepping out of the office, you can always enjoy total control without being tied down. With its broad range of features, popular applications, expansion capabilities and multimedia solutions, you can have all the essentials you need at the affordable value you want. All units run Microsoft Windows Mobile 5.0 Premium Edition and come with 12 months manufacturer's warranty.

Includes: AC Adaptor, USB Sync Cable, Stylus, Companion CD and Documentation Kit



(Image for illustration purposes only)

iPAQ	rx1950	hx2190	hx2790
PROCESSOR	300MHz	312MHz	624MHz
MAIN MEMORY	32MB RAM	64MB RAM	64MB RAM
DISPLAY	<----- 3.5" Transflective QVGA TFT Display ----->		
WEIGHT	125g	164g	164g
EXPANSION	SDIO	CF / SDIO	CF / SDIO
COMMUNICATIONS	WiFi	BT	BT & WiFi
RENT*			\$8.95/wk
PART NUMBER	T0945	T0897	T0897
PRICE	\$399	\$499	\$799



FOR BUSINESSES ON THE MOVE

GENERATION WI-FI

WI-FI AND A LARGE COLOUR SCREEN AT A PRICE YOU CAN AFFORD

Affordable Wi-Fi is here. With built in Wi-Fi and Bluetooth® technology, the **Palm® TjX handheld** is the wireless device you've been waiting for. Browse the web, check email[†], and see everything on a large colour screen. Work on your Word, Excel, and PowerPoint files[‡] - or have some fun and listen to MP3s[§]. It's anything but business as usual.

PALM TJX HANDHELD

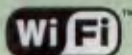
- Built-in Wi-Fi and Bluetooth wireless technology
- High resolution 320x480 screen, rotates to landscape or portrait
- 128MB[†] flash memory keeps your information safe
- Browse the web and send email[†]
- View photos and videos, play MP3 files and podcasts[‡]
- View, edit, and create Word, Excel, and PowerPoint compatible files[‡]
- MultiMediaCard, SD, and SDIO expansion card compatible
- Intel 312MHz processor

[†] 100MB actual storage capacity.

[‡] Within wireless service coverage area only. Bluetooth functionality requires compatible Bluetooth device; web and email require data plan and an ISP, all sold separately. Some Wi-Fi hotspots require fee for usage. Microsoft Exchange Server 2003 or VPN may be required.

[§] PowerPoint support for Macintosh is view only.

[§] Expansion card required for Macintosh, sold separately. Internet download may be required.



T0850

\$499

ORGANISED FUN

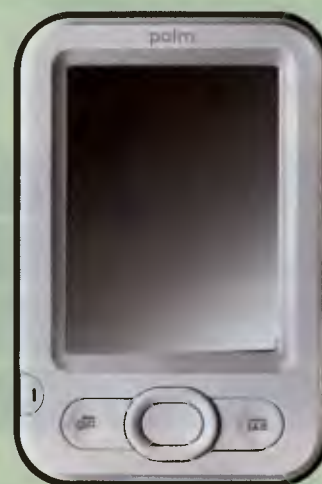
GETTING IT TOGETHER HAS NEVER BEEN THIS EASY

Meet the **Palm® Z22 organiser**. It's so easy to use, you can get started in a few simple steps. Pick it up. It's small and light. Turn it on. There's a bright colour screen. Appointments, phone numbers, to do lists, and photos - keep it all there.

PALM Z22 HANDHELD ORGANISER

- Organises appointments, contacts, to do lists
- Simple, easy to use
- Bright, colourful screen
- Keeps your information safe
- Compact and lightweight
- Holds hundreds of photos
- 32MB memory[†]

[†] 20MB actual storage capacity.

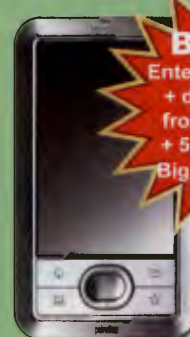


T0851

\$179

[†]Bonus offers available between 15/11/05 to 15/01/06. Only while stocks last. Not available in conjunction with any other offer.

REVOLUTIONISE THE WAY YOU MANAGE YOUR LIFE WITH LIFEDRIVE



BONUS
Entertainment CD
+ digital prints
from FUJIFILM
+ 5 songs from
BigPond Music[†]



LifeDrive™

Palm introduces the LifeDrive Mobile Manager. **With 3.8GB of storage and built in WiFi & Bluetooth support**, you can easily carry files from your desktop computer; 300 songs, 2.5 hours of video[†], vacation photos, and more. Includes support for POP, IMAP and Exchange email accounts, plus onboard voice recorder, MP3 player, and photo viewer.

- 4GB hard drive
- LifeDrive smart file management
- Wi-Fi (802.11b) and Bluetooth v1.1
- 320 x 480 hi-resolution, colour display
- Supports native Word, Excel, and PowerPoint files
- Supports secure wireless email access with attachments
- Built-in Microsoft Exchange ActiveSync[‡]

[‡]Requires Microsoft Exchange Server 2003

Rent* \$7.83/wk

S1814

\$699

[†] Some files may require conversion

*RENTSMART

The figures quoted are based on a per week basis over 3 years. Terms and conditions apply.

PLEASE NOTE:

All purchases subject to terms & conditions and returns policy. Delivery charges may apply. Not all items stocked in store but available for pick-up/delivery.



FOR LOVERS OF MUSIC

ITUNES MUSIC CARDS



Give an iTunes Music Card to the music lovers in your life and let them re-discover old favourites or keep up with the hottest hits. With the prepaid card, they can purchase songs from the #1 music download store and listen to them anywhere with iPod or on their computers with iTunes for Mac or Windows.

To redeem iTunes prepaid cards:

- Download iTunes for Mac or Windows at www.itunes.com
- Open iTunes and click Music Store
- Click Prepaid Cards
- Enter the code printed on the attached card when requested
- Download your songs. Enjoy!

T0782	\$20 CREDIT	\$20
T0783	\$50 CREDIT	\$50
T0784	\$100 CREDIT	\$100

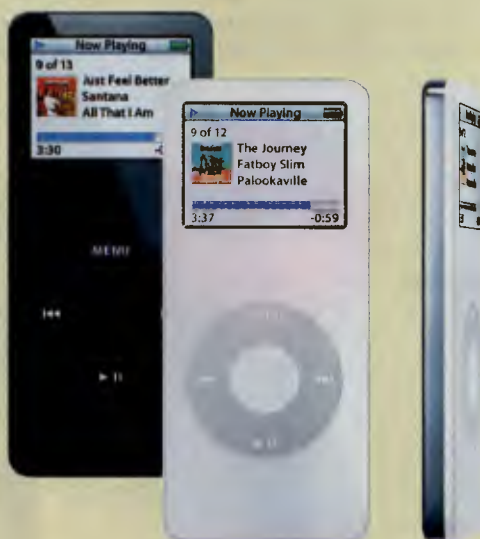
*RENTSMART

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IPOD NANO



The you-have-to-hold-it-to-believe-it iPod nano.
The revolution is in your hands.
iPod nano. Get yours today.

- Up to 1,000 songs² or 25,000 photos³
- Just 0.27" thin and 1.5 ounces
- Vivid, backlit colour display
- Up to 14 hours of battery life¹
- Completely skip-free playback
- Available in white or black
- For Mac and Windows

S9613	2GB WHITE	\$299
S9614	2GB BLACK	\$299
S9616	4GB WHITE	\$359
S9615	4GB BLACK	\$359

IPOD SHUFFLE



Meet iPod shuffle, the unpredictable new iPod.
What will it play next? Can it read your mind? Can read your moods? Load it up. Put it on. See where takes you.

- Personalise your iPod shuffle with iTunes
- Autofill from your entire music library for a fresh mix
- Autofill from specific playlists
- Drag and drop songs
- Control your music with the simple button interface
- Wear iPod shuffle with the included lanyard
- Run, jump or shimmy down to skip-free playback
- Enjoy up to 12 hours of continuous playback
- Play MP3, AAC, podcasts and audiobooks
- Fill iPod shuffle in a flash via USB
- Store files along with your music
- Charge in four hours via USB or optional Power Adapter

R6116	512MB	\$149
R6118	1GB	\$199

¹ Rechargeable batteries have a limited number of charge cycles and may eventually need to be replaced. Battery life and number of charge cycles vary by use and settings. See www.apple.com/batteries for more information.

² Music capacity is based on 4 minutes per song and 128-Kbps AAC encoding. 1,000 song capacity refers to 4GB Nano model. 1GB = 1 billion bytes; actual formatted capacity less.

³ Photo capacity is based on iPod viewable photos transferred from iTunes.

Services & Networking

NEED COMPUTER HELP?

TECHNICAL SERVICES AVAILABLE FROM HARRIS TECHNOLOGY

INSTALLATION SERVICE - THE EASY WAY TO SET UP YOUR HOME OFFICE

Harris Technology and Quickknowledge have partnered to bring our home office customers a simple and easy to use installation service.

Setting up your computer can be difficult and time consuming. Our installation and setup service ensures that your computer, including printers, scanners, software and Internet connection are setup and installed correctly. This service can help save longer term problems that often arise out of incorrect installation and setup.

Our trained support consultants will assist you in understanding the capabilities of your new technology devices. We can also provide preventative maintenance activities as well as assist you with virus removal and training.

Our service offerings include:

- Computer setup and optimisation
- Network setup including internet connections and wireless network installations
- Virus protection and removal

How does it work?

Call one of our consultants on **1300 13 9999** or drop into one of our business centres for more information.

onSite

a consultant on your doorstep

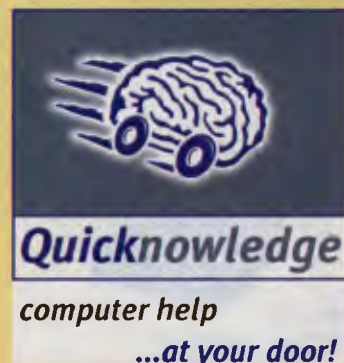
onCall

computer help a phone call away

onLine

learn at home, at your own pace

Book your service today!



ENGIN VOICE OVER IP SOLUTIONS



"10c Untimed, Anytime, Anywhere to any Landline phone across Australia"

VOICE BOX 1



**\$100
CASH
BACK¹**

Engin Voicebox Series 1 is \$49 after cashback!!

The Series 1 is a device you plug directly into your ADSL modem/router or router, it utilises your broadband connection so that you can make and receive calls through the Internet simply by picking up the handset you have plugged into the voice box and dialling as per normal. The series 1 has a facility for 2 engin lines giving you the capability of adding a second Voice line at the cost of \$9.95 per month, this second line can be used simultaneously to the first.

S9648

\$149

VOICE BOX 2



**\$100
CASH
BACK¹**

Engin Voicebox Series 2 is \$129 after cashback!!

Series 2 incorporates your current PSTN land line into the voice box as well as the VoIP service. This allows your Voice Box Series 2 to divert back to your landline phone service in the event of a power or connection (ISP) outage. Anywhere connect works when you are out and still want to take advantage of your cheap engin calls. Simply call your own home phone number and get connected to your Voice Box Series 2 from a remote location.

S9649

\$229



The Broadband Phone Company

LINKSYS WIRELESS ROUTER



T0726

\$229

PLEASE NOTE:

All purchases subject to terms & conditions and returns policy. Delivery charges may apply. Not all items stocked in store but available for pick-up/delivery.

¹ Purchases must be made between 1/01/2006 and 31/01/2006. Terms and conditions apply. See engin.ht.com.au

WIRELESS / BROADBAND SOLUTIONS

USB NETWORK STORAGE ADAPTER



DNS-120

- Connect up to 2 USB Hard Drives or Flash Drives
- Built-in FTP Server to Access Files over the Internet
- Backup Function to Schedule Full or Incremental Backups
- Easy Search Utility for Quick Discovery and Mapping Drives

T0575

\$163

NETWORK ATTACHED STORAGE WITH HDD BAY



DNS-300

- 3.5" hard drive bay
- 2 high-speed USB 2.0 ports for printer, external hard drive connection
- Built-in printer server function
- UPnP support for easy configuration
- System configuration file backup

T3296

\$291

NETWORK ATTACHED STORAGE WITH 120GB HDD



DNS-312H

- 120GB 7200 Spindle Speed (RPM) 3.5" hard drive pre-installed
- 2 high-speed USB 2.0 ports for printer, external hard drive connection
- Built-in printer server function
- UPnP support for easy configuration
- System configuration file backup

T3297

\$540

PLEASE NOTE:

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HANDSET WITH \$10 CALL CREDITS VIA GO-TALK



**\$10
FREE
CREDIT**

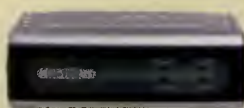
DPH-120S/GO

- Connects to Internet through LAN
- \$10 Free credit for GO-Talk IP Phone Services
- The DPH-120S can also be used with LANs with Ethernet & IP protocol Support
- The DPH-120S is a speakerphone. It has a large LCD to display dial-out and call-in numbers. It also has redial, mute, transfer, voice mail, 3-way conference, call waiting, call forwarding & hold functions
- Operates just like any ordinary telephone

T0578

\$188

VOIP ACCELERATOR



DI-102

- Intelligently prioritises bandwidth-sensitive traffic
- Ideal for real-time applications such as VoIP, video streaming and gaming
- Improves call quality and minimises interruptions
- Plug and Play - sits between your modem and router

T0652

\$151

DGL-4100 BROADBAND GIGABIT GAMING ROUTER



DGL-4100

- Optimised gaming experience with GameFuel Technology
- 4 Gigabit Ethernet ports
- Customisable settings for games and applications

C9274

\$264

WIRELESS 108G GAMING ROUTER



DGL-4300

- Optimised gaming experience with GameFuel Technology
- Up to 108Mbps 802.11g wireless connectivity
- 4 Gigabit Ethernet Ports
- Customisable settings for games and applications

L6109

\$318

WIRELESS 108AG GAMING ADAPTER



DGL-3420

The DGL-3420 GamerLounge™ Wireless 108AG Gaming Adapter has been specifically designed for network-ready game consoles. This adapter enables wireless connectivity and boasts a maximum wireless signal rate of up to 108Mbps.

T3609

\$170

These products are for delivery only. Delivery charges apply. See page 63 for details.

WIRELESS / BROADBAND SOLUTIONS

HIGH SPEED WIRELESS



DI-624

- Up to 108Mbps
- Advanced firewall & parental control
- Easy installation
- 802.11g, 802.11b compatible
- Increased Security with 802.1X and WPA

J4539

\$153

AIRPLUS WIRELESS G ROUTER



DI-524

- 54Mbps high-speed wireless broadband Internet access
- 802.11g Standard, 802.11b compatible
- Built in 4 port fast Ethernet switch for ready server connection
- DHCP server for automatic user IP assignment

S0650

\$99

ADSL MODEM/ROUTER



DSL-G604T

- ADSL2/2+ modem/router with 54Mbps wireless and built in 4 port switch
- Integrated ADSL modem with 4 port fast Ethernet 10/100Mbps switch and integrated 802.11g WLAN access point
- Built-in SPI firewall, DHCP server

P3062

\$164

AIRPLUS XTREME GTM 108Mbps WIRELESS STORAGE ROUTER



DI-624S

- Wirelessly share broadband Internet connection
- 802.11g, 802.11b compatible
- Advanced firewall & parental control
- Integrated functions with 6 built-in servers for DHCP, personal web, FTP, file/printer/multimedia sharing

T0648

\$203

AIRPLUS GTM 11 / 54Mbps WIRELESS IP ROUTER WITH USB PRINT SERVER



DI-524UP

- Built-in 4 port fast Ethernet switch
- Advanced Firewall features, VPN pass through
- WEP, WPA & 802.1X Security
- UPnP enabled
- Bigpond cable client
- Detachable antenna

T0646

\$130

ADSL/ADSL-2 ROUTER WITH 4 PORTS



DSL-504T

- ADSL2/2+ modem/ router with built in 4 port switch
- Integrated ADSL modem with 4 port fast Ethernet 10/100Mbps switch
- Built-in SPI Firewall, DHCP server, advanced routing, filtering, port forwarding and DMZ

S1493

\$108

AIRPLUS XTREME G WIRELESS 108Mbps USB ADAPTER DWL-G132



S7919

\$93

AIRPLUS XTREME G WIRELESS 108Mbps PCI ADAPTER DWL-G520



H9622

\$81

AIRPLUS XTREME G WIRELESS 108Mbps NOTEBOOK ADAPTER DWL-G650



H9621

\$89

AIRPLUS WIRELESS G PORTABLE USB ADAPTER DWL-G122



P3058

\$59

AIRPLUS WIRELESS G PCI ADAPTER DWL-G510



S0663

\$45

AIRPLUS WIRELESS G NOTEBOOK ADAPTER DWL-G630



S1164

\$48

PLEASE NOTE:

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A LEADER IN WIRELESS NETWORKING

CORDLESS INTERNET
TELEPHONY KIT

CIT200

- You don't have to sit in front of your computer to talk to your friends with Skype™
- USB Base Station connects to your PC and puts your Skype contact list on the handset's screen just choose and talk
- Handset features illuminated Caller ID screen, speakerphone, call waiting, and intercom to other (optional) handsets

T3126

\$219WIRELESS G ROUTER FOR
3G/UMTS BROADBAND

WRT54G3G

- All-in-one Internet-sharing router, 4 port switch, and Wireless G (802.11g) Access Point
- Shares a Vodafone 3G/UMTS or GPRS Internet connection and other resources with Ethernet wired and Wireless G clients
- Includes PC Card slot for any Vodafone Mobile Connect 3G/UMTS data card (available separately)
- High security: Wi-Fi Protected Access™ (WPA/WPA2 Personal), wireless MAC address filtering, powerful SPI firewall

T3429

**\$395**

PLEASE NOTE:

All purchases subject to terms & conditions and returns policy. Delivery charges may apply. Not all items stocked in store but available for pick-up/delivery.

4 PORT ADSL2 GATEWAY
SWITCH

AG241

- High speed ADSL 2/2+ Modem
- Built-in router and 4 port switch
- Jump start your Ethernet network and share the Internet throughout your household
- Advanced firewall and security features protect your PCs, your data, and your family
- Compatible with both ADSL1 or ADSL2 standards

R8981

\$143COMPACT WIRELESS G
BROADBAND ROUTER

WRT54GC

- All-in-one Internet-sharing router, 4 port Switch, and Wireless G (802.11g) Access Point
- Shares a single Internet connection and other resources with Ethernet wired and Wireless G and B devices
- Compact form factor fits in anywhere
- High security: Wi-Fi Protected Access™ (WPA/WPA2 Personal), wireless MAC address filtering, powerful SPI firewall

S6818

\$119WIRELESS G ADSL
GATEWAY

WAG54G

- ADSL 2/2+ modem with 4 x 10/100 switch ports
- Wireless 802.11g 54MB access point, supports both 11MB & 54MB clients
- Wireless security includes WEP, WPA & 802.1x
- Powerful stateful packet firewall with denial of service attack prevention
- VPN server, 5 VPN tunnels - also supports VPN pass-through
- 3 year manufacturer exchange warranty

M5307

\$186WIRELESS G BROADBAND
ROUTER

WRT54G

- All-in-one wireless internet router, allows you to share your broadband connection wirelessly, 802.11G wireless, 4 port 10/100 Ethernet switch
- Wireless data rates up to 54Mbps
- Shares a single internet connection and other resources with Ethernet wired and Wireless G clients
- Advanced wireless security with 128 bit WEP encryption, MAC or IP address filtering
- 3 year manufacturer limited warranty

H9739

\$124WIRELESS G RANGE
EXTENDER

WRE54G

- The easiest way to expand your wireless network's coverage
- Save on wiring costs - no wired connection to your network necessary
- Extend your wireless signal into hard-to-reach areas
- Compatible with both Wireless G and Wireless B networking clients

P9344

\$129WIRELESS G BROADBAND
ROUTER WITH SRX

WRT54GX

- Internet-sharing router, 4 port switch, with a built-in speed and range enhanced Wireless G (802.11g) Access Point
- Shares a single Internet connection and other resources with Ethernet wired, Wireless G, Wireless B, and other SRX devices
- New SRX technology: the farther away, the more advantage up to 8 times faster than standard Wireless G (802.11g)
- SRX also increases wireless range by up to 3 times and reduces dead spots in coverage area

R8671

\$299

These products are for delivery only. Delivery charges apply. See page 63 for details.

BROADBAND SOLUTIONS FOR HOME & SMALL BUSINESS

MYNETGATEWAY



NB9W

- All your broadband Internet needs in one device
- Features ADSL2+ modem, 4 port QoS router, 2x FXS (VoIP) ports, 1x FXO line port for landline telephone backup and 11g (54Mbps) Wireless Access Point in one box
- Layer 3 Quality of Service (QoS) router ensures high quality VoIP calls
- Web-based configuration for your choice of broadband and VoIP Service Providers

T3138



\$249

WIRELESS ROUTER



NEW

NB600W

- Powerful wireless router to network and share broadband Internet services to wired and wireless users
- 4 port 10/100 Ethernet switch
- Features Atheros Super G Wireless Access Point for up to 108Mbps. Compatible with 54Mbps and 11Mbps wireless
- Active Firewall and WEP/WPA wireless security

88402

\$147

SUPER G WIRELESS PCI CARD (108Mbps)



NP642

89012

\$79

SUPER G WIRELESS PC CARD (108Mbps)



NP643

89013

\$79

SUPER G WIRELESS LAN USB KEY



NP644

48990

\$99

V85 VOIP DESKTOP PHONE



V85

- The ideal SOHO/Small business workstation IP Phone
- Will easily connect into an IP PBX
- Built-in PC port can connect the phone and a computer using the one network port
- Full duplex speakerphone, 10 number speed-dial, 50 number phone book
- SIP Compatible IP Telephone for home and business
- Configure using web browser or Dual-row LCD and phone keypad

35010

\$189

TURBO HOMEPLUG



NEW

NP285

- Create a local area network or share broadband using your power points
- Faster HomePlug standard – up to 85Mbps
- A great way to connect gaming consoles to the Internet
- Backward compatible with 14Mbps HomePlug

T3595



\$279

NEW INDOOR WIRELESS BOOSTERS

200mW INDOOR WIRELESS BOOSTER



NP560

- Installed between your wireless Router/Access Point and attach the existing aerial
- Boosts your wireless signal up to 9x more
- Uses industry-standard SMA connectors
- Compatible with 802.11 g/b wireless equipment

T3411

\$199

500mW INDOOR WIRELESS BOOSTER



NP562

- Installed between your wireless Router/Access Point and attach the existing aerial
- Boosts your wireless signal up to 22x more
- Uses industry-standard SMA connectors
- Compatible with 802.11 g/b wireless equipment

T3598



\$249

PLEASE NOTE:

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These products are for delivery only. Delivery charges apply. See page 63 for details

INTELLIGENT KVM SOLUTIONS

SERVERLINK KVM EXTENDER FOR PS/2



Use standard Cat5 cabling to extend your monitor, keyboard and mouse up to 150m away in a remote location. Also connect a second computer at the remote location, giving you control of both computers. Supports PS/2 keyboard & mouse.

- Uses Cat5/Cat5E/Cat6 UTP cabling
- Adjustable video compensation for optimum signal
- Supports video resolution up to 1600 x 1200

S6923

**\$499**

SERVERLINK IP REMOTE ACCESS



Access your servers from anywhere in the world! The ServerLink IP allows network administrators to manage, configure, troubleshoot and even reboot remote servers from any web browser.

Rent* \$8.67/wk

Q5544

**\$774**

*RENTSMART

The figures quoted are based on a per week basis over 3 years. Terms and conditions apply.

PLEASE NOTE:

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SERVERLINK ELITE KVM

The ServerLink Elite KVM switches allow you to control your servers with a single keyboard monitor and mouse. Using high-density connections these 8 and 16 port switches use only 1U of rack space making them the ideal choice for any server room where space is at a premium.

Featuring a user-friendly pop-up screen menu control yet requires absolutely no software. The On-Screen-Display enables you to rename your computers to make selection quick and simple. Select any computer directly from your keyboard using simple hot-key commands.



Rent* \$6.57/wk

P2748 8 Port KVM Inc 8 x 2m Cables

\$587

Rent* \$8.35/wk

P2749 16 Port KVM Inc 16 x 2m Cables

\$745

SERVERLINK SLIM KVM

The ServerLink Slim Desktop KVM Switch is designed to let you control two or four PS/2 style computers using one keyboard, monitor and mouse. With its slim size and ease of operation, it is an indispensable device for managing multiple PCs on your SOHO or Corporate desktop. Its compact and lightweight design fits comfortably anywhere on your desktop.

With its single integrated 15 pin connector for PS/2 keyboard, monitor and mouse interface, there will be no more cabling clutter on your desktop. The ServerLink Slim comes with an all required Slim 3-in-1 KVM combo cables for connection to your PC.



Q5542 2 Port KVM with cables

\$92

Q5543 4 Port KVM with cables

\$186

SERVERLINK STAR 2 PORT KVM

Control two PCs with a single keyboard, monitor and mouse. All ServerLink Star KVM switches have audio and microphone support for multimedia applications. The one piece design combining the KVM switch and cables is built to reduce cabling nightmares.



Control 2 PS/2 computers

Q5539 PS/2

\$73

Control 2 USB computers

Q5540 USB

\$83

Control 1 PS/2 + 1 USB computer

Q5541 PS/2+USB

\$79

These products are for delivery only. Delivery charges apply. See page 63 for details.

USB - STORAGE & CONNECTIVITY

COMSOL FLASHIT² USB 2.0 FLASH DRIVE

The Comsol flashIT² USB 2.0 flash drive is the ideal choice for your portable storage needs. The flashIT² allows you to transfer your documents, presentations, pictures, music and more between work, home or any other place.

- Hi-Speed USB 2.0 certified
- Password security feature
- True plug & play
- PC & Mac compatible

flashIT²



S3103 256MB **\$49**

S3105 1GB **\$149**

S3104 512MB **\$79**

R6660 2GB **\$279**

COMSOL USB VoIP PHONE

- SKYPE ready - talk for free with other Skype users
- Works with most leading VoIP providers
- Make huge savings on local, standard and international calls
- Ideal for the mobile traveller
- LCD display, keypad and ringer
- Echo cancellation and noise reduction enhances clarity



C5200 **\$60**

COMSOL USB 2.0 CARD READER 27 IN 1

- Hi-Speed USB 2.0 certified
- Supports most popular memory card formats
- Transfer files by user friendly drag-and-drop
- Supports Plug & Play and Hot swapping



R5964 **\$39**

COMSOL 5 PORT USB 2.0 HI-SPEED PCI CARD

- 4 x External USB 2.0 ports
- 1 x Internal USB 2.0 port
- Backward compatible with USB 1.1 devices
- Data transfer rate up to 480Mbps for each port



N2275 **\$39**

COMSOL 3 PORT IEEE1394 FIREWIRE PCI CARD

- 3 x External FireWire 6 pin ports
- 1 x Internal FireWire 6 pin port
- Add IEEE1394 FireWire support to your PC
- Ideal for digital cameras, hard drives, CD-RWs and other FireWire devices



D8946 **\$43**

COMSOL USB 2.0 HDD ENCLOSURES

- Hi-Speed USB 2.0 Certified
- Lightweight aluminium housing for durability and portability
- Screwless design for quick and easy assembly



T3688 2.5" HDD ENCLOSURE **\$44**

S8234 4 PORT USB 2.0 DESKTOP HUB **\$35**

T3689 3.5" HDD ENCLOSURE **\$89**

S8232 7 PORT USB 2.0 DESKTOP HUB **\$45**

COMSOL USB 2.0 DESKTOP HUBS

- Hi-Speed USB 2.0 Certified
- Blue LED to indicate power status
- No software required for easy installation



COMSOL USB 2.0 QUICKLINK CABLE



Carry case included

Five different USB cable configurations

- A Male to B Male
- A Male to A Female
- A Male to Mini B Male
- Mini A Male to B Male
- Mini A Male to Mini B Male

P9191

\$29

COMSOL IEEE1394 FIREWIRE QUICKLINK CABLE



Carry case included

Three different Firewire cable configurations

- 6 Pin to 6 Pin
- 6 Pin to 4 Pin
- 4 Pin to 4 Pin

S9464

\$39

PLEASE NOTE:

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GO GIGABIT

GIGABIT PCI ETHERNET ADAPTER



GA311

With Netgear's Gigabit PCI Adapter, your desktop PC can transfer huge video, CAD, and database files at super fast speeds. It easily and instantly connects you to other networked computers, printers, routers, network storage, and the Internet.

- 1000Mbps performance, 10x faster than Fast Ethernet
- Smart Wizard install assistant to make setup quick and easy
- Supports all major operating systems

M2693

\$29

GIGABIT PC CARD



GA511

Netgear Gigabit PC Card injects dynamic force into your notebook PC so you can transfer huge files at astonishing speeds.

- 1000Mbps performance, 10x faster than Fast Ethernet
- Smart Wizard install assistant to make setup quick and easy
- Supports all major operating systems

Q2474

\$78

*RENTSMART

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5 PORT GIGABIT SWITCH



GS605

- 5 10/100/1000Mbps Ethernet ports
- Smart-honors 802.1p priority tags, great for VoIP applications
- Silent-noise-free operation for a peaceful work environment

P0187 GS605 5 PORT

\$96

P0189 GS608 8 PORT

\$153

16 PORT GIGABIT SMART SWITCH



GS716T

- 16 10/100/1000Mbps gigabit ports
- Easy, browser-based switch management
- 2 SFP GBIC Slots for optional fibre connectivity move above the browser based management

S7139

\$528

12 PORT GIGABIT LAYER 2 MANAGED SWITCH



GSM7212

- Complete managed software feature set for Layer 2 switching
- 12 non-blocking 10/100/1000Mbps copper Gigabit Ethernet ports
- 12 Small Form-factor Pluggable (SFP) fibre interfaces
- Full Layer 2 management suite
- Flexibility of fiber connections with combo ports

Rent* \$12.75/wk

R5825

\$1,138

12 PORT GIGABIT LAYER 3 MANAGED SWITCH



GSM7312

- 12 RJ-45 ports for Gigabit Ethernet
- 12 SFP slots for optional fibre gigabit connections
- Dynamic routing and QoS capabilities for VoIP and video conferencing
- Complete Layer 3 software - OSPF, RIP I/RIP II, Static, VLAN routing

Rent* \$27.37/wk

L2403

\$2,562

16 PORT GIGABIT SWITCH



GS116

- Compatible with either PC, Macintosh, Unix, or Linux operating systems
- Providing PnP simplicity with exceptional performance & reliability
- Every port automatically senses the right speed & mode, while Auto Uplink™ technology automatically adjusts for straight-through or crossover cables

P0140

\$455

48 PORT GIGABIT SMART SWITCH



GS748T

- 48 non-blocking 10/100/1000Mbps ports
- 4 SFP GBIC slots for fibre connectivity options
- Smart Management features for trunking, VLANs, and traffic prioritisation

Rent* \$22.01/wk

Q9557

\$1,964

24 PORT GIGABIT LAYER 2 MANAGED SWITCH



GSM7224

- 24 auto-sensing 10/100/1000 Mbps ports
- 4 combo ports for optional fibre connections
- Full Layer 2 management feature set
- SNMP, RMON, VLAN, QoS, port trunking, and more
- Built-in testing capability locates cable-related problems
- GUI and CLI management interfaces

Rent* \$17.17/wk

Q2108

\$1,532

24 PORT GIGABIT LAYER 3 MANAGED SWITCH



GSM7324

- 24 RJ-45 ports for Gigabit Ethernet
- 4 SFP slots for optional fibre gigabit connections
- Complete Layer 3 software - OSPF, RIP I/RIP II, Static

Rent* \$34.49/wk

J6587

\$3,311

These products are for delivery only. Delivery charges apply. See page 63 for details.



NETGEAR™

harristechnology



Networking

NETGEAR MAKES STORAGE EASY

STORAGE CENTRAL

SC101

Store your files, music, video, games, photos, and financial records in one central location, accessible as a letter drive.

- Share files easily with everyone on the network, while keeping your personal files private
- Safeguard your valuable files by keeping real time duplicate copies - automatically, effortlessly
- Setup and configuration are a breeze
- Advanced Backup software included
- Easy upgradeability through IDE drives*
- Connect via RJ - 45 Ethernet

* Hard drives must be purchased separately.



34265

\$192

RANGEMAX MODEM ROUTER ADSL 2/2+ 108Mbps

DG834PN

Five products in one, the DG834PN combines an ADSL2+ modem, router, 10/100 LAN switch, RangeMax access point, and SPI Double Firewall. It gives you untethered continuous connectivity to your network resources and the Internet, and allows you to share your broadband access with all of your networked computers wirelessly or with wires using Ethernet cables.

- Extends your Ethernet network with high-speed wireless access, up to 108Mbps
- RangeMax Smart MIMO (Multi-In, Multi-Out) technology navigates through possible interference
- Fully compatible with Wi-Fi certified 802.11b, 802.11g, and SuperG® devices
- SmartWizard™ Installation Assistant



T0680

\$289

DG834GT ADSL 2/2+ 108Mbps WIRELESS MODEM ROUTER

Q5517

\$239

DG834G ADSL 2/2+ 54Mbps WIRELESS MODEM ROUTER

L2609

\$173

DG834 ADSL 2/2+ MODEM ROUTER

L2610

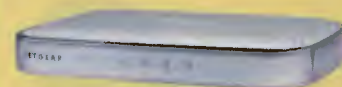
\$108

DG632 ADSL 2/2+ USB/ETHERNET MODEM

N6517

\$84

SMART BROADBAND VOICE ADAPTER WITH ENGINE



TA612V

- Turns your Broadband Internet Service into a Telephone
- 2 ports to connect analogue phones & fax machines
- Shares Internet connection via Ethernet ports & Broadband modem
- Prioritises voice traffic for optimum Quality of Service (QoS)
- Call features include: Caller ID, call waiting & voicemail

S9656

\$145

WIRELESS ROUTER BUNDLE



WGR614 WIRELESS G ROUTER + 4 PORTS & WG511 WIRELESS G NOTEBOOK ADAPTER

Router:

Cable/DSL 54Mbps Wireless Router lets you experience the blazing-fast network wireless speeds of 54Mbps - up to five times faster than the popular 802.11b wireless network.

Adapter:

- Supports office roaming for notebook PC users for shared broadband Internet access & resources.
- Highest available level of WEP encryption 128bit for both 802.11b/802.11g

Q0913

\$99

PLEASE NOTE:

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STORAGE SOLUTIONS

EXTERNAL DL
LIGHTSCRIBE DVD
BURNER

Create your own fabulous custom designs with crisp text, graphics and photos, which you can add to again and again.

- Easily burns professional labels
- Convenient - no need for a printer
- Professional quality laser precision and detail

LaCie DL + LightScribe
16x DVD±RW - USB 2.0

T3116 **\$189**

LaCie d2 DL SuperDrive
LightScribe 16x DVD±RW - USB
2.0 + Firewire
(Includes PC/Mac software)

T3124 **\$229**

LACIE FIREWIRE 800 PCI CARD
(3 PORTS)



J6551 **\$129**

*RENTSMART

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Porsche EXTERNAL
MOBILE DRIVES

NB: The key is not included

- Ultra-lightweight, only 200g
- AC adapter free
- BUS powered via USB 2.0 or Firewire

40GB Porsche EXTERNAL
USB 2.0 & FIREWIRE MOBILE DRIVE

S2458 **\$225**

80GB Porsche EXTERNAL
USB 2.0 & FIREWIRE MOBILE DRIVE

S1929 **\$319**

LACIE CARTE ORANGE 8 GB
USB 2.0 KEY

Imagine how fun it will be to carry your photo album, MP3 library, and mini-camcorder in a device the size of a credit card for sharing with friends and colleagues whenever you want to. The LaCie Carte Orange is extremely convenient to carry thanks to its rugged design and compact credit card sized shape.

Features:

- Credit card-sized USB key with 8GB capacity
- Compact, rugged metal design
- True plug & play convenience
- Integrated Hi-Speed USB 2.0 cable
- No need for power-supply or adapter
- No need for power-sharing cable
- Driver-free for Windows 2000/XP and Mac OS X
- Ultra-thin 6mm (.23") width

T3091 **\$279**

d2 ETHERNET DISK MINI



- File sharing over a network
- Hi-Speed USB 2.0 interface for private storage
- Share level security via web-based administration tools
- Simultaneous data access by multiple users
- File sharing between Windows, Mac and Linux clients
- Upright, stackable or rack mountable design
- Can be used as a standard USB2.0 hard drive

250GB EXTERNAL d2 ETHERNET MINI + USB 2.0
DRIVE

S5488 **\$429**

d2 EXTERNAL HARD DISK DRIVES



LaCie d2 drives have been designed for professional users in mind. Beyond the fact that they are robust, lightweight, fast cooling and noise free, these drives have unique features such as Kensington cable lock slot, autoswitch power on/off with your computer and are rackmountable in 19" rack.

250GB d2 EXTREME
USB/FIREWIRE/FW800

S9086 **\$379**

500GB d2 BIGDISK EXTREME
USB ONLY

T3460 **\$499**

1000GB d2 BIGGERDISK
USB/FIREWIRE/FW800

S8584 **\$1,209**

Rent* \$13.55/wk

BELKIN ACCESSORIES

NOTEBOOK MOBILITY BUNDLE



- Notebook bag for 15.4" notebooks with shoulder strap for comfort
- MiniScroller optical mouse, perfect for travel
- 4 port micro hub for added flexibility on the road

T0583

\$69

MINI USB GLO MOUSE WITH RETRACTABLE CORD



- Delivers the Plug-and-Play convenience of USB
- Flexible, left or right handed functionality
- Radiates attractive color-changing lights
- Comes with a Belkin Lifetime Warranty

R9475

\$33

15-IN-1 MEDIA READER/WRITER WITH 3 PORT USB 2.0 HUB



- Transfer data from different media cards simultaneously
- Connects up to 3 USB 1.1 or 2.0 devices at transfer speeds of up to 480Mbps
- Includes Photo-Editing software from Ulead® (DVD PictureShow™, Photo Explorer™)
- Connect other USB equipment with Plug-and-Play ease
- Comes with a Belkin Lifetime Warranty

R7119

\$79

SPORTS DIGITAL CAMERA CASE



- Offers quick camera access with convenient, top-loading design
- Attaches conveniently to your belt with nylon belt loop
- Stows batteries, memory cards and more in internal accessory pouch
- Protects with foam padding and weather-resistant material

T3181

\$25

BLUETOOTH USB ADAPTER V1.2



- Improved voice application function
- Bluetooth v1.1 and v1.2-compliant devices
- Allows you to work at distances of up to 10 metres
- Small convenient form factor

S9425

\$65

WIRELESS SLIM KEYBOARD & OPTICAL MOUSE



- Quick and easy set-up
- Install with Plug-and-Play convenience of USB
- 800dpi optical resolution
- Provides precision, accuracy and control
- Notebook style keys for light and quiet typing

T3182

\$99

SUPERIOR SERIES 6-WAY (2M CORD) + TEL + \$150,000 WARRANTY



- Provides longer-lasting surge protection with higher joule ratings
- Provides greater spike and lightning absorption with higher maximum spike current ratings

N3367

\$99

TUNECAST II DIGITAL FM TRANSMITTER



Transmits on FM channels 88.1MHz - 107.9MHz. Includes DC cable for battery-free operation.

N0665

\$65

USB 2.0 4 PORT HUB WITH TOP LOADING PORT FOR IPOD, FLASH DRIVE, ETC.



Package includes Hi-Speed USB 2.0 4 port hub, power adapter, USB device cable. Provides four 480Mbps downstream ports.

T3184

\$49

AUTO & MOBILE POWER KIT WITH DOCK CONNECTOR



Charge your iPod from your car's cigarette lighter. Features 3.5mm audio output that plays your iPod through the car stereo.

L0541

\$69

PLEASE NOTE:

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These products are for delivery only. Delivery charges apply. See page 63 for details.

STORE YOUR WORLD IN OURS

SANSa E100 SERIES
MP3 PLAYERS

Features:

- Headphones included
- Digital FM tuner with 20 preset stations
- New custom navigation allows sorting songs by artist, album, song title, genre, year, date loaded, and more
- Can be used as an external storage device for data store and transfer
- Enhanced sound fidelity with SRS WOW
- Up to 17 hours continuous playback using one AAA battery[^]

[^]Based on standard playback, 128kbps MP3 with SRS WOW in off mode.

S6834 BLUE 512MB **\$149**

S6959 SILVER 1GB **\$225**

PLEASE NOTE:

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COMPACT FLASH CARDS TYPE 1

This popular storage device is about the size of a matchbook and has a high transfer rate. As the inventor of this product, Sandisk has led the market for Compact Flash since its inception.

- High transfer rate for fast copy/download
- Operating shock rating of 2,000Gs, equivalent to a 10-foot drop to the floor
- Compatible with all digital cameras, handheld PCs, digital audio players, and other devices that feature a CompactFlash slot



D5310 256MB **\$43**

E8511 1GB **\$135**

J0492 512MB **\$72**

P5253 2GB **\$265**

MINI SECURE DIGITAL CARDS

One of the world's most popular memory card formats for mobile phones, the miniSD provides all of the same functions as a full-size SD including built-in security for copyrighted content along with great performance for storing music, video, and photographs for use on-the-go. SanDisk provides the broadest range of capacities for miniSD to meet your needs.

- Built-in security features enable users to download, store and play secure content
- The miniSD card is bundled with an adaptor for use in both SD and miniSD electronic devices giving you added flexibility and protection of your investment



R0508 512MB **\$82**

R9345 1GB **\$146**

SANDISK PHOTO ALBUM

Memories are made to be shared with family and friends. SanDisk makes it easy, in more ways than one. Use your TV to view, share and store digital photos and video clips. No computer necessary!

- Store up to 2000 digital photos
- Plug & Play easy to install
- Use as 8-in-1 reader/writer when connected to your PC

* Memory cards are not included



Q9031

\$75

STORE YOUR WORLD IN OURS

CRUZER MICRO WITH SKINS

Cruzer Micro is an incredibly small USB Flash Drive (UFD) that connects to a computer's USB port. With capacities ranging from 256MB to 2GB, users can easily store their key documents, pictures, music and videoclips on a Cruzer Micro and transfer them to another computer with a USB port. The new version of Cruzer Micro with Skins provides the capability to change the color of your Cruzer with new covers and caps.

- Stylish, clear overmold casing
- Brilliant blue LED
- Hi-Speed USB 2.0 certified (backwards compatible with all USB 1.1 ports)
- USB Mass Storage Class Device
- Compatible with Windows 98SE, ME, 2000, XP and Mac OS 9.1.x+, OS X v10.1.2+
- Certified Windows XP and Mac OS X



P0698 256MB	\$40	S2289 1GB	\$122
P0699 512MB	\$63	S2290 2GB	\$240

SECURE DIGITAL CARDS

The SD Card is a highly secure stamp-sized flash memory card. The SD Card weighs approximately two grams. The SD Card can be used in a variety of digital products; digital music players, cellular phones, handheld PCs (HPCs), digital cameras, digital video camcorders, smart phones, car navigation systems and electronic books.

- Fast transfer rate for reliable copy/download/backup
- Non-volatile solid-state; no moving parts maximises battery power. Data is not lost when power is turned off
- Low battery consumption to maximise battery life in small portable devices
- Operating shock rating of 2,000Gs, equivalent to a 10-foot drop to the floor



G3995 256MB	\$43	N7731 1GB	\$130
M3944 512MB	\$69	T3573 2GB	\$259

MEMORY STICK PRO DUO CARDS



SanDisk's Memory Stick PRO Duo is half the size of a standard-size Memory Stick PRO media and it offers the same technologies including high speed data transfer, built-in MagicGate, and high capacities. The Memory Stick PRO Duo is the ideal solution for the most portable devices such as pocket-size digital cameras and with the use of Adaptor, it can be used in all PRO-compatible devices.

Features:

- High speed data transfer
- High capacities
- Embedded MagicGate technology for safe transfer of copyright protected content
- Adaptor included
- Compatible to all Memory stick pro media devices with the use of the Adaptor

Q4275 256MB	DELIVERY ONLY	\$59
Q4276 512MB	DELIVERY ONLY	\$108
R3311 1GB	DELIVERY ONLY	\$148
S5848 2GB	DELIVERY ONLY	\$289

DELIVERY ONLY These products are available for delivery only. Delivery charges apply.

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GET MOBILE...GET TARGUS

NOTEBOOK ESSENTIALS BUNDLE



Includes:

- Includes 15.4" notebook case
- Wired mini optical mouse
- 4 port mini USB 2.0 hub

40272

\$69

LIFESTYLE MESSENGER BUNDLE



Includes:

- Vibe 15.4" messenger case
- Retractable mouse
- USB 2.0 4 port hub
- **BONUS** 128MB flash drive - while stocks last

A5088

\$109

LIFESTYLE BACKPACK BUNDLE



Includes:

- Slam 15.4" backpack
- Retractable mouse
- USB 2.0 4 port hub
- **BONUS** 128MB flash drive - while stocks last

A5086

\$119

PLEASE NOTE:

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RADIUS & URBAN NOTEBOOK CASES



Radius Top Loaders

- Fits 15.4" screen notebooks
- Interior pockets for your files & accessories
- Removable shoulder strap
- Easy access compartment for iPod/MP3 player
- Durable nylon material

20384 Radius Top Loader Charcoal

\$85

20388 Radius Top Loader Silver

\$85

Urban Top Loader Urban Messenger

- Fits 15.4" screen notebooks
- File section with removable CD/DVD sleeves
- Magnetic compartment for iPod/MP3 player
- Rugged design with scratch resistant lining & weather resistant bases

20389 Urban Top Loader

\$85

20391 Urban Messenger

\$85

DESKTOP LASER MICE



WIRELESS LASER MOUSE FOR DESKTOP

- 20 times more tracking sensitivity than typical optical mice, for greater accuracy and improved use on shiny surfaces
- Recharge via the USB charge cable
- RF wireless technology
- Handy pre-programmed buttons

A6108

\$65

LASER MOUSE FOR DESKTOP

- 20 times more tracking sensitivity than typical optical mice, for greater accuracy and improved use on shiny surfaces
- Comfortable full size ergonomic design
- Handy pre-programmed buttons

A6109

\$55

NOTEBOOK LASER MICE



WIRELESS & RECHARGEABLE LASER MOUSE FOR NOTEBOOKS

- 20 times more tracking sensitivity than typical optical mice, for greater accuracy and improved use on shiny surfaces
- Recharge via the USB charge cable
- RF wireless technology

A6110

\$65

RETRACTABLE LASER MOUSE FOR NOTEBOOKS

- 20 times more tracking sensitivity than typical optical mice, for greater accuracy and improved use on shiny surfaces
- Retractable cable
- Plug and play

A6112

\$55

SEAGATE EXTERNAL HARD DRIVES

EXTERNAL HARD DRIVE 3.5" 7200 RPM FIREWIRE/USB 2.0



HIGH CAPACITY, AMAZING PERFORMANCE

These high capacity drives make it easy to store and backup your data. You can safely store business files, movies and photos, the latest games, your favourite music and more. And the interlocking design lets you securely expand your Seagate storage.

ENGINEERED FOR HIGH PERFORMANCE

7200 RPM drive with 8MB cache and whisper quiet motor lets you effortlessly store and work with massive amounts of data.

BUILT FOR SAFETY AND SECURITY

Seagate hard drives are safeguarded by built-in self monitoring technology that continuously checks your hard drive for data safety and drive performance. SeaTools diagnostic software is included.

WORRY FREE, ONE YEAR WARRANTY

Warranty covers all parts and labour.

DRIVE SPECIFICATIONS

- 8MB cache
- 7200 RPM
- 350 Gs non-operating shock resistance
- Mac and PC compatible

R3677 200GB (USB 2.0+FireWire) **\$319**

R3678 300GB (USB 2.0+FireWire) **\$419**

Rent* \$6.26/wk

R3679 400GB (USB 2.0+FireWire) **\$559**

PORTABLE DRIVE 2.5" EXTERNAL 5400 RPM USB 2.0



EXCEPTIONAL PORTABILITY AND PERFORMANCE

Enjoy easy storage and access of large digital music, photo, video, data and multimedia files both on the desk and on the go.

ENGINEERED FOR HIGH PERFORMANCE

This 5400 RPM hard drive features a whisper quiet SonicSoft FDB motor, and delivers 50 percent more performance than 4200 RPM drives - with no increase in power consumption. You get higher speed while conserving battery life.

FAST AND EASY

Supports speeds up to 480Mbps, is hot swappable and powered by the USB bus - there's no need for power cords or adapters.

BUILT FOR SAFETY AND SECURITY

Seagate hard drives are safeguarded by built-in self monitoring technology that continuously checks your hard drive for data safety and drive performance. SeaTools diagnostic software is included.

WORRY FREE, ONE YEAR WARRANTY

Warranty covers all parts and labour.

DRIVE SPECIFICATIONS

- 2MB cache (40GB) / 8MB cache (100GB)
- 5400 RPM
- 5000 Gs non-operating shock resistance
- Mac and PC compatible

R3680 40GB **\$219**

R3682 100GB **\$399**

SEAGATE COMPACT FLASH TYPE II HARD DRIVES



These high-capacity, 1" photo hard drives are the perfect storage solution for professional and enthusiast photographers. Available in 4GB and 8GB capacities, you can quickly store thousands of high-resolution photos without changing the card. And with their rugged design and world-renowned Seagate quality, you can count on data integrity and protection from drops and falls.

- Ultra-fast 3600-RPM drives with 2MB cache
- Built to last, inside and out, so the drive and data are protected
- Designed for digital cameras with a CF+ Type II media slot
- Compatible with a wide and growing range of FAT32-formatted digital cameras
- 3600-RPM drives with 2MB cache consistently deliver the high performance you need
- Worry-free, one-year warranty covers all parts and labour

T3725 4GB **\$249**

T3726 8GB **\$449**

*RENTSMART

The figures quoted are based on a per week basis over 3 years. Terms and conditions apply.

PLEASE NOTE:

All purchases subject to terms & conditions and returns policy. Delivery charges may apply. Not all items stocked in store but available for pick-up/delivery.

PC, NETWORK & SERVER STORAGE SOLUTIONS

MAXTOR ONETOUCH II™ SMALL BUSINESS EDITION SERVER BACK UP - 200GB NATIVE / 300GB COMPRESSED[^]



SIMPLE BACKUP FOR A SMALL BUSINESS SERVER

Designed for the small business, the **Maxtor OneTouch II, Small Business Edition** installs easily and includes a simple wizard interface for setting up unattended, automated backup schedules, drive management, security and backup settings, and file restoration.

Specifically developed for the small business server, comprehensive backups include operating system, settings, updates, applications, databases, address books, emails, documents and even open files!

Rent* \$8.95/wk

S4043 200GB

\$799

[^] Compression assumes 3:2 compression ratio. Actual compression may vary dependent on type of data.

*RENTSMART

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PLEASE NOTE:

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MAXTOR ONETOUCH II™ - SMART STORAGE WITH PUSH-BUTTON BACKUP

Just press the button and your files are backed up in one simple step. Faster than CD. Faster than a floppy. Faster than removable cartridge systems. Space for your photos, videos, graphics, music, documents and more. It connects to FireWire or USB ports on a PC or Mac. It backs up with the Maxtor OneTouch™ button or runs automated backups using the included software, Dantz® Retrospect® Express. And you can customise the button to launch any application. Powerful, yet simple backup.

QUICK AND EASY INSTALLATION

- 1 INSTALL THE SOFTWARE
- 2 PLUG IN THE DRIVE
- 3 PUSH THE BUTTON AND FOLLOW ON-SCREEN DIRECTIONS



R3323 100GB (USB 2.0)

\$219

R3322 200GB (USB 2.0 + FIREWIRE)

\$279

Q3145 250GB (USB 2.0 + FIREWIRE)

\$359

Q3146 300GB (USB 2.0 + FIREWIRE)

\$389

MAXTOR SHARED STORAGE PLUS

NOW WITH SCHEDULED BACK UPS & MEDIA STREAMING

The Maxtor Shared Storage™ Plus solution lets you easily centralise, organise, back up and share family photos, music and data on a home or small office network. Installation is simple - just plug it into your router via Ethernet and the automatic configuration seamlessly integrates into small office and home TCP/IP-based networks.

FEATURES

- 2 USB ports let you add shared network printers or external storage
- Access files from multiple PCs simultaneously
- You can set access privileges and keep selected folders private
- With Maxtor exclusive Drag and Sort™ technology, you can instantly organise files by dragging them from your desktop PC to the Maxtor Shared Storage Drive
- SimpleView™ provides quick backup and storage status
- Plays back digital photos, music and video to networked home entertainment system¹
- With its sleek, anodised aluminium shell and compact size, the Maxtor Shared Storage Plus Drive fits anywhere in your home or small office
- 1 year warranty

¹Media streaming requires UPnP certified Digital Media Adapter (DMA)

R7907 200GB (USB 2.0)

\$399

Q1270 300GB (USB 2.0)

\$499





CD/DVD PRODUCTION - BURN & PRINT

DELIVERY ONLY All Region4 products are available for delivery only. Delivery charges apply. See page 63 for details.

BRAVO II DUPLICATE PRINT



PRIMERA
TECHNOLOGY, INC.

- All-in-one desktop disc publishing system
- One burning drive & 4800 dpi printer
- 25 disc capacity standard (50 disc capacity using optional kiosk mode kit)
- Autoprinter only also available
- PC and Mac compatible

Rent* \$40.82/wk

N2215 1 DVD±R DRIVE



\$3,999

RIMAGE DTP360I PUBLISHER



R I M A G E™

- Totally automated and easy to install and use
- One DVD/CD burning drive & 4800dpi printer
- 25 disc capacity
- Powerful, intuitive wizard based software
- World class Rimage quality
- Ability to create unique discs using publishing capability

Rent* \$40.82/wk

S1146 1 DVD±R DRIVE



\$3,999

BRAVOPRO DUPLICATE PRINT



PRIMERA
TECHNOLOGY, INC.

BravoPro
DISC PUBLISHER

- Professional, all-in-one CD/DVD publishing on your desktop
- Totally automated and hands free
- 2 burning drives & 4800dpi printer
- Afterburner print technology for fastest throughput in its class
- 100 disc capacity
- Networking software included
- PC and Mac platform software included

Rent* \$55.36/wk

Q9577 2 DVD±R



\$5,999

RIMAGE DTP 2000I PUBLISHER

R I M A G E™



- 2 drives CD or DVD
- 100 disc capacity
- Totally automated and hands free
- Duplication and Publishing capability
- Incorporates 480i disc printer
- Network software supports PC or MAC clients
- Up to 2 units on one PC
- Plug and play

Rent* \$59.97/wk

N2213 2 DVD±R DRIVE



\$6,499

BURN ONLY

evoccept



COPYSMART SOLO

- Speedy 1-1 8x DVD duplicator
- LCD display and 4 button panel
- Dual layer support

S7940



\$499

COPYSMART BLAST DVD 3 DRIVE

- Speedy 3 drive tower duplicator
- 160GB hard drive
- Up to 16x DVD with dual layer support



Rent* \$15.68/wk
Q2085 **\$1,399**

COPYSMART BLAST DVD 7 DRIVE

- Speedy 7 drive tower duplicator
- 160GB hard drive
- Up to 16x DVD with dual layer support



Rent* \$24.64/wk
Q2087 **\$2,199**

- CD only models also available

*RENTSMART

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Verbatim

REMOVABLE DATA STORAGE AND SOLUTIONS

PROFESSIONAL HI-FI
HEADSET

- Super bass 50mm drivers
- Cushioned leatherette ear pads

T3815  **\$32**RETRACTABLE
EARPHONE/MIC 1.5M

- Dual function - mono headset
- Unique retractable design

T3817  **\$8**

USB WIRELESS HEADSET



- 2.5GHz USB wireless headset
- Digital transmission for high quality

T3818  **\$109**USB 2 CHANNEL
SPEAKERS

- USB Bus-powered (no external power required)
- 5.1ch Virtual Sound in 2 Speakers

T3859  **\$28**

PLEASE NOTE:

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DVD-R - 10 PACK
16x 4.7GB - JEWEL CASES8190 **\$10**DVD+R - 25 PACK
16x 4.7GB - SPINDLEQ6492 **\$19**DVD+RW - 5 PACK
4x 4.7GB - JEWEL CASES9454 **\$7**DVD+R DL - 5 PACK
8x 8.5GB - JEWEL CASET3820 **\$55**DVD+R DL - 3 PACK
2.4x 8.5GB up to 6x with
compatible drives - JEWEL CASES8714 **\$20**DVD+R DL - 20 PACK
2.4x 8.5GB - INKJET PRINTABLE
WHITE - SPINDLES8528 **\$10**DVD+R - 50 PACK
8x 4.7GB INKJET PRINTABLE
MEDIA - SPINDLEQ6489 **\$37**DVD-R - 50 PACK
8x 4.7GB THERMAL WHITE
WIDE - SPINDLEQ3397 **\$37**DVD+R - 20 PACK
8x 4.7GB LIGHTSCRIBE - SLIM
CASER8528 **\$20**CD-R - 50 PACK
52x 700MB/80MIN WHITE
INKJET PRINTABLE - SPINDLEQ5985 **\$23**CD-R - 50 PACK
52x 700MB/80MIN SILVER INKJET
PRINTABLE SPINDLEQ6490 **\$19**CD-R - 10 PACK
52x 700MB/80MIN -
LIGHTSCRIBE - JEWEL CASER8052 **\$7**

These products are available for delivery only. Delivery charges apply. See page 63 for details.

MICROSOFT HARDWARE

COMFORT OPTICAL MOUSE 3000



High Definition Optical Technology
Magnifier - point and click to enlarge and edit
Tilt Wheel Technology for 4 way scrolling
Four programmable buttons
Comfort designed for either hand

T0613

\$35

STANDARD WIRELESS OPTICAL MOUSE BLACK



- Value in a Wireless Optical Mouse
- Scroll wheel
- Comfort for either hand
- Three buttons
- Longer battery life

P7012

\$42

WIRELESS OPTICAL MOUSE 5000



- High Definition Optical Technology
- Tilt Wheel Technology for 4 way scrolling
- Ergonomic design
- Five programmable buttons
- Longer battery life

S9536

\$65

NATURAL ERGONOMIC KEYBOARD 4000



Advanced ergonomic design
Gull wing design - more direct key strikes for less finger effort
Reverse slope optional palm lift for a more natural wrist posture
Zoom slider take a closer look at images, documents, and more

T0577

\$67

COMFORT CURVE KEYBOARD 2000



- NEW - comfort curve keyboard shape for improved ergonomics
- Compact design
- Ultra thin sleek profile
- Spill resistant design

T0464

\$35

WIRED KEYBOARD 500



The Microsoft Wired Keyboard 500 gives you one touch access to email, the Web, and the Microsoft Windows features you use most. The compact, durable keyboard design fits easily in most keyboard trays or just gives you more space on your desktop.

S8328

\$24

WIRELESS OPTICAL DESKTOP 000 - BLACK



Wireless Freedom - no cords or recharging station!
Hot Keys - Get one touch access to the functions and files you go to most
Enhanced F Keys - Perform common tasks right from your keyboard.
Media Center - one touch access to play/pause, stop, mute, volume up/down, media launch etc.

S1429

\$69

WIRELESS OPTICAL DESKTOP ELITE



- Wireless Freedom - no cords or recharging station!
- Longer Battery Life
- Revolutionary Tilt Wheel Technology
- "My favorites" keys
- Complementary keyboard navigation
- Includes optical mouse and keyboard

L0515

\$139

WIRED DESKTOP 500



The Microsoft Wired Keyboard 500 gives you one touch access to email, the Web, and the Microsoft Windows features you use most. The compact, durable keyboard design fits easily in most keyboard trays - or just gives you more space on your desktop.

T0614

\$35

WIRELESS NOTEBOOK OPTICAL MOUSE BLUE



- Includes a snap-in receiver for working on the go
- Gain precision accuracy with the latest in optical technology
- Designed by ergonomic experts for comfort in either hand
- Wireless Freedom with Longer Battery Life

P7046

\$62

NOTEBOOK OPTICAL MOUSE SILVER



Now there's a stylish mouse you can take everywhere. Microsoft Notebook Optical mouse features Microsoft optical technology for smooth, accurate performance. Contoured for comfort and scaled down in size, Notebook Optical Mouse is always good to go.

G3159

\$35

PLEASE NOTE:

All purchases subject to terms & conditions and returns policy. Delivery charges may apply. Not all items stocked in store but available for pick-up/delivery.

PIONEER DVD SUPER MULTI DRIVE

FEATURES

Various original technologies to improve quality and reliability in recording

- Ultra Dynamic Resonance Absorber
- Buffer Under-run Protection
- Precision Recording Technology

High-speed recording and low noise operation

Pioneer's original honey comb structure and other improvements to the internal structure have drastically reduced operation noise during high speed rotation.

Performance Adjusting Firmware automatically optimises the disc's rotation speed depending on user's requirements and keeps operation noise at the minimum in the write and read modes.

DVR-A10XL

Pioneer's DVD multi drives support the recording and playback of recordable discs in seven DVD formats (DVD-R, Dual Layer DVD-R, DVD-RW, DVD-RAM, DVD+R, DVD+R Double Layer, and DVD+RW) as well as CD-R and CD-RW discs. The DVD drives offering the industry-leading write speeds realise the high speed recording of maximum 8x*1 on single-sided double-layer DVD formats (Dual Layer DVD-R and DVD+R Double Layer). At the same time, they provide high-quality recording and high reliability with quiet operation owing to Pioneer's proprietary technologies irrespectively of disc formats.

The writers will come bundled with an extensive collection of NERO OEM software applications for DVD/CD authoring, editing, and data recording.



T3166 BEIGE

\$99



T3164 BLACK

\$99

HP INKJET CONSUMABLES

HP ORIGINAL REWARDS

HP Original Rewards is an exciting program from HP that rewards SMB for purchasing (and recycling) HP LaserJet Print Cartridges, Inkjet Cartridges and HP Paper. Register now to receive points for every purchase invoice you send in. Terms & conditions apply. For more details see www.hp.com.au/originalrewards

HP PLANET PARTNERS

HP Planet Partners and Cartridges 4 Planet Ark have created a program that extends not only the life of your print cartridges, but also the life of the planet. More information at: www.hp.com.au/recycle

PLEASE NOTE:

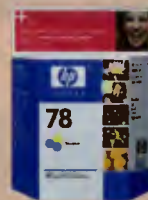
All purchases subject to terms & conditions and returns policy. Delivery charges may apply. Not all items stocked in store but available for pick-up/delivery.

HP Supplies Authorised Reseller



i n v e n t

HP C6578DA - NO 78 TRI-COLOUR INKJET PRINT CARTRIDGE

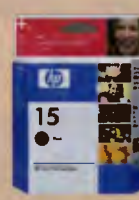


C6578DA

S3034

\$55

HP C6615DA - NO 15 BLACK INKJET PRINT CARTRIDGE



C6615DA

A2595

\$55

HP NO 56 BLACK INKJET CARTRIDGE



C6656AA

S2199

\$34

HP C9363WA NO 97 TRI COLOUR INK CARTRIDGE



C9363WA

Q1870

\$59

HP 57 TRI-COLOR INKJET CARTRIDGE AP



C6657AA

F9886

\$57

PRINTERS

Printers

KYOCERA PRINTERS

MONO DUPLEX PRINTER



FS-920

- Up to 18ppm A4
- Power PC 405 266MHz
- 600 x 600 dpi
- 32MB (Maximum: 288MB)
- 11 seconds to print first page
- 250 sheet input cassette
- 15,000 pages per month maximum duty cycle

R3899

\$379

MONO DUPLEX PRINTER



FS-1020D

- Up to 20ppm A4
- Power PC 405 266MHz
- 600 x 600 dpi
- 16MB RAM (Maximum: 272MB)
- 10 seconds to print first page
- A4, B5, letter, legal paper sizes

N2191

\$545



FS-3830N



- Up to 33ppm A4
- PC 750 CX/300MHz
- 600 x 600 dpi
- 96MB RAM (Max: 576MB)
- 11.5 seconds to print first page

Rent* \$17.69/wk

N6150

\$1,579

*RENTSMART

The figures quoted are based on a per week basis over 3 years. Terms and conditions apply.

BROTHER PRINTERS

BROTHER MFC-215C



- Colour Printer, Colour Scanner, Colour Flatbed Copier, Colour Fax, PhotoCapture Centre, and PC-Fax
- Capillary tube printing technology for low noise and energy saving
- 4 separate ink cartridges (black yield 500 pages & colour yield 400 pages)
- 8MB Memory as standard
- Easy operation

S9335

\$149

BROTHER MFC-8840D



HOT PRICE

- 5 in 1 laser flatbed MFC with built-in duplex
- Flatbed digital copier up to 20cpm with built-in duplex.
- Plain paper fax 33.6kbps high speed fax modem, up to 5000 page memory
- Laser printer, up to 20ppm, up to 2400 x 600 dpi resolution
- Pcl6 and BRScript 3, built in duplex

Rent* \$11.19/wk

N8094

\$999



BROTHER FAX-8360P LASER FAX MACHINE



- Super G3 33.6K bps high speed Fax Modem
- Up to 14ppm Laser Engine for printing of faxes and copies

N8094

\$799

PLEASE NOTE:

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EPSON PRINTERS

A3 INKJET PRINTER



STYLUS PHOTO R2400

New to Epson photographic printing family is the Stylus Photo R2400 – the A3+ inkjet printer designed for fine art reproductions, commercial quality photographs and design proof printing. With an array of Epson-developed technologies including the new UltraChrome K3 Ink set and a 1" wide, multi-layered piezo print head; unrivalled quality is the only result.

- New Epson UltraChrome K3 Ink with Matte Black (or Photo Black), Light Black and now Light, Light Black for outstanding greyscale balance
- 5760 optimised dpi using Epson's Resolution Performance Management (RPM) technology
- 1" wide multi-layered piezo print head for smooth, detailed and fast prints
- Epson's K3 Inks enable quick drying times and greater colour stabilisation

Rent* \$19.04/wk

S3206

\$1,699

*RENTSMART

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PLEASE NOTE:

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COLOUR MULTIFUNCTION PRINTER

EPSON RX700

- High speed printing - up to 20ppm mono / 19ppm colour
- Scan directly from 35mm film or slides to digital images
- Bluetooth compatible connection
- Individual Intellidrive ink cartridges one for each of 6 colours



Rent* \$7.27/wk

S3301

\$649

COLOUR LASER

EPSON AL C1100

The Epson AcuLaser C1100 is the affordable colour and monochrome laser printer that delivers high speed, photo quality prints for small businesses and workgroups that require a compact and easy-to-use solution.



Rent* \$8.05/wk

Q7367 AL-C1100

\$719

COLOUR LASER

EPSON AL C2600N

- The flexibility of mono, high volume mono or colour printing configurations. Upgrade as your printing requirements change
- High print speeds of up to 30ppm mono and 7.5ppm colour
- Genuine Adobe® PostScript3 as standard
- Standard 2 year onsite warranty



Rent* \$17.92/wk

S9445

\$1,599

COLOUR LASER AL-CX11NF MULTIFUNCTION PRINTER

EPSON AL-CX11NF

- High speed printing at up to 25ppm mono and 5ppm colour
- Optical scanning resolution up to an enhanced 9600 dpi
- Epson's wrap transfer system for added speed and accuracy of toner placement
- Full faxing capabilities with up to 60 speed dials



Rent* \$19.94/wk

S8454 AL - CX11NF

\$1,779

COLOUR LASER

EPSON AL C3000N

- Up to 24ppm in full colour
- Resolution: 2400 dpi (with Epson RIT)
- Integrated 10/100 Base TX Network Interface
- Duplexing: Standard
- 600 page input standard
- Standard 2 year onsite warranty



Rent* \$21.29/wk

Q7725

\$1,900

COLOUR LASER

EPSON AL C9100

- Up to 24ppm in colour & monochrome (A4)
- First page out: 10.5 seconds in monochrome (A4), 12 seconds in colour (A4)
- Resolution: 2400 dpi with resolution improvement technology
- Network interface standard
- Banner printing



Rent* \$46.73/wk

S8053

\$4,939

These products are available for delivery only. Delivery charges apply.. See page 63 for details

EPSON PRINTERS

CD/DVD PHOTO PRINTING



EPSON R310

- Six individual colour ink cartridges
- Support for most digital memory cards
- Print directly onto compatible CD and DVD media
- Print direct from compatible digital cameras via PictBridge without a computer
- Print speed up to 15ppm black text (A4 Memo)
- True border free edge to edge photo printing

M5315

\$239

STYLUS INKJET



EPSON C67

- Epson DuraBrite Ultra Ink-Set 120 years lightfastness
- 5760 x 1440 optimised dpi using RPM technology
- Up to 17ppm
- Individual ink cartridges
- True border free edge to edge printing on A4 and 4 x 6 paper
- Compatible with a large range of Epson media from photo glossy paper to normal bond paper

T3412

\$97

STYLUS MULTI FUNCTION



EPSON PHOTO RX630

- Up to 17ppm for black text A4 (memo)
- 5760 x 1440 optimised dpi (using RPM Technology).
- Border free printing up to A4
- Individual ink cartridge one for each of 6 colours
- Standalone colour copier functionality without a computer
- High resolution 2400 x 4800 dpi scanner featuring colour restoration software
- Prints from digital memory cards, direct from PictBridge cameras and direct from USB memory devices

Q5675

\$365

COLOUR MFP



EPSON RX700

- High speed printing – up to 20ppm black text
- Scan directly from 35mm film or slides to digital images
- Bluetooth compatible connection for maximum versatility
- Individual Intellidrive ink cartridge one for each of 6 colours

S3301

\$649

Rent* \$7.27/wk

EPSON TONERS

EPSON T0491 BLACK INK FOR STYLUS PHOTO R310/ RX-510

M0952

\$18

EPSON T0492 CYAN CARTRIDGE FOR R310/ RX-510

M1054

\$18

EPSON T0495 LIGHT CYAN CARTRIDGE FOR R310/ RX-510

M1055

\$18

EPSON T0496 LIGHT MAGENTA CARTRIDGE FOR R310/ RX-510

M1060

\$18

EPSON T0631 BLACK INK CARTRIDGE FOR EPSON C67

T3404

\$13

EPSON T0633 C67/C87 MAGENTA INK CARTRIDGE

T3409

\$12

EPSON T0632 CYAN INK CARTRIDGE FOR EPSON C67

T3408

\$12

EPSON T0634 YELLOW INK CARTRIDGE FOR EPSON C67

T3410

\$12

*RENTSMART

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PLEASE NOTE:

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MONO LASERJET PRINTER SERIES

HP LASERJET 2430 SERIES



- Prints up to 33ppm
- 1200 dpi RET & FastRes 1200 dpi
- 64MB RAM, expandable to 320MB
- 400MHz processor

HP LJ 2430TN Rent* \$24.18/wk
Q2892 **\$2,158**

HP LJ 2430DTN Rent* \$24.45/wk
Q2893 **\$2,289**

HP LASERJET 4250 SERIES



- Up to 43ppm in A4
- Resolution: 1200 dpi
- 500 sheet tray & 100 sheet multi-purpose tray
- Monochrome laser
- Two open industry-standard CompactFlash slots

HP LJ 4250 Rent* \$19.04/wk
Q3919 **\$1,699**

HP LJ 4250N Rent* \$24.45/wk
Q2900 **\$2,289**

HP LJ 4250TN Rent* \$28.83/wk
Q2894 **\$2,699**

HP LJ 4250DTN Rent* \$34.18/wk
Q2890 **\$3,249**

*RENTSMART

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PLEASE NOTE:

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LASERJET 1020



- **Speed:** Prints up to 14ppm in A4
- **First page out:** 10 seconds
- **Resolution:** 1200 dpi
- **Duty cycle:** 5000 (pages/month)
- **Connectivity:** USB 2.0 high speed

R9102 **\$229**

LASERJET 1022 SERIES



- **Speed:** Prints up to 18ppm in A4
- **Resolution:** 1200 dpi
- **Duty cycle:** 8000 (pages/month)
- **Connectivity:** USB 2.0
- 8MB RAM

R9103 LJ 1022 **\$379**

R9104 LJ 1022N **\$549**

LASERJET 1320 SERIES



- **Speed:** Prints up to 21ppm in A4
- **Resolution:** 1200 dpi
- **First page out:** 8.5 seconds
- 16MB RAM
- 133MHz Processor

P9319 LJ 1320 **\$689**

P9320 LJ 1320N **\$829**

P9321 LJ 1320TN **\$989**

HP LASERJET ALL-IN-ONES FOR OFFICE PRINTING

LASER PRINT, PC FAX, LASER FAX, SCAN & DIGITAL COPY

- No waiting time (first page out as fast as 8 seconds for LJ 3380)
- Print resolution: 1200 dpi effective output

LASERJET 3015 ALL-IN-ONE



- **Print:** 15/14ppm (letter/A4), 32MB RAM
- **Copy:** 15/14 cpm
- **Scan:** 600 x 600 dpi optical resolution (9600 dpi enhanced), colour scanning
- **Fax:** 33.6kbps

M7636 **\$449**

LASERJET 3030 ALL-IN-ONE



- **Print:** 15/14ppm (letter/A4), 32MB RAM
- **Copy:** 15/14 cpm
- **Scan:** 600 x 600 dpi optical resolution (9600 dpi enhanced), colour scanning
- **Fax:** 33.6kbps

M7638 **\$699**

LASERJET 3380 ALL-IN-ONE



- **Print:** 20/19ppm (letter/A4), 32MB RAM (expandable to 96MB)
- **Copy:** 20/19 cpm
- **Scan:** 600 x 600 dpi optical resolution (9600 dpi enhanced)
- **Fax:** 33.6kbps

M7639 **\$999**

HP COLOUR LASERJET PRINTERS

HP COLOR LASERJET 3600 SERIES



Affordable high volume colour printing for the small workgroup.

Fast 16ppm colour and 16ppm mono printing
360 MHz processor

Duty Cycle up to 50,000 per month

Rent* \$12.87/wk

T3243 HP Color LJ 3600  **\$1,149**

Rent* \$14.89/wk

T3244 HP Color LJ 3600N  **\$1,329**

Rent* \$20.68/wk

T3250 HP Color LJ 3600DN  **\$1,845**

HP COLOR LASERJET 2840 MFP



- Network ready Color LaserJet All-in-One
- Print, scan, copy and digital card-slot
- Fast laser printing 19ppm mono and 4ppm colour
- 1200 dpi resolution scanner
- Super G3 Fax V.34 fax modem (up to 33kbps)

Rent* \$19.60/wk

S1217 HP Color LJ 2840 **\$1,749**

HP COLOR LASERJET 3800 SERIES



Affordable high volume colour printing for the small workgroup

Fast 21ppm colour and 21ppm mono printing
96MB RAM (160MB for CLJ3800n, 288 MB for CLJ3800dn)

High quality printing with HP ImageREt 3600
533 MHz processor

Duty Cycle up to 65,000 per month

Rent* \$21.46/wk

T3256 HP Color LJ 3800N  **\$1,915**

Rent* \$26.70/wk

T3258 HP Color LJ 3800DN  **\$2,499**

HP COLOR LASERJET 4700 SERIES



High Performance Colour Printer

- Perfect for your work group
- High quality printing with HP ImageREt 3600
- After speed add: Duplex prints at 30ppm
- Versatile paper handling and connectivity

Rent* \$40.98/wk

T3589 HP Color LJ 4700DN  **\$4,015**

Rent* \$52.92/wk

T3590 HP Color LJ 4700DTN  **\$5,735**

HP COLOR LASERJET 2600N PRINTER



- Fast 8ppm colour laser printing
- High quality, reliable and quiet entry level in line printing
- Vibrant quality colour printing with ImageRET2400
- Standard 10/100 network printing
- Standard 375 page input for versatile printing
- Small true personal desktop design

Rent* \$7.56/wk

S2505 **\$675**

Q6003A Colour Laser 2600 Magenta Toner

S5172 **\$126**

Q6002A Colour Laser 2600 Yellow Toner

S5171 **\$126**

Q6001A Colour Laser 2600 Cyan Toner

S5170 **\$126**

Q6000A Colour Laser 2600 Black Toner

S5168 **\$116**

*RENTSMART

The figures quoted are based on a per week basis over 3 years. Terms and conditions apply.

PLEASE NOTE:

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 These products are for delivery only. Delivery charges apply. See page 63 for details.

HP DESKJET & OFFICEJET SERIES

HP DESKJET 3940



Easy-to-use, compact printer for basic photo and document printing.

- Up to 4800 optimised dpi
- Up to 1200 x 1200 dpi black
- Up to 16ppm black
- Up to 12ppm colour
- 80-sheet input tray, 50-sheet output tray
- Intuitive, on-screen menus for easy operation

S7444

\$69HP DESKJET 4255
ALL-IN-ONE

Ultra compact all-in-one: **print, fax, scan, copy and phone** in one small machine.

- Up to 17ppm in black, up to 1200 x 1200 dpi
- Up to 12ppm in colour, up to 4800 x 1200 optimised dpi colour & 1200-input dpi
- Scan quality up to 36-bit colour
- Fax transmission 33.6Kbps

N8513

\$189***RENTSMART**

The figures quoted are based on a per week basis over 3 years. Terms and conditions apply.

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HP PSC 1610
ALL-IN-ONE

- **Print:** up to 23ppm black, 18ppm colour, up to 4800 x 1200 optimised dpi
- **Scan:** up to 1200 x 4800 dpi
- **Copy:** 600 dpi mono, up to 1200 x 4800 dpi colour
- View, edit and print photos with or without a PC with PictBridge port
- Digital media card slots

OFFICEJET 5610
ALL-IN-ONE

- **Print:** Up to 20ppm black, 13ppm colour
- **Fax:** 33.6kbps fax modem
- **Scan:** 1200 x 2400 dpi optical resolution
- **Copy:** Up to 20ppm black, 13ppm colour
- Two line text LCD display
- Junk fax barrier

PHOTOSMART 3310
ALL-IN-ONE

- **Print & Copy:** Up to 32ppm black, 31ppm colour
- **Fax:** 33.6Kbps fax modem
- **Scan:** 4800 x 4800 dpi optical resolution
- Print 4x6" photos from 14 seconds
- Wireless 802.11g
- 6 individual ink cartridges
- View, edit and print photos with or without a PC
- 3.6" colour LCD display
- Memory card reader and PictBridge

Rent* \$6.26/

R5058

\$185

T3163

\$245

T1646

\$55

HP OFFICEJET PRO K550



High volume business printing - lower running cost than laser!

- Breakthrough speed: Print up to 37ppm black, 33ppm colour
- Up to 4800 optimised dpi
- 4 individual ink cartridges
- 250 sheet input tray
- 7500 page duty cycle

T3724

\$359

HP OFFICEJET 7210 ALL-IN-ONE



- **Print:** up to 30ppm black, 20ppm colour
- **Fax:** 33.6kbps fax modem
- **Scan:** up to 2400 x 4800 optical resolution, 48-bit colour
- **Copy:** 30ppm black, 20ppm colour
- Ethernet
- 50 page ADF
- 8 types of memory card support + PictBridge

Rent* \$6.26/

R5061

\$55



QUALITY AND INNOVATION, NO RISK



**BONUS
Toner¹**

MONO LASER PRINTER

SAMSUNG ML-2010

- Prints up to 20ppm in A4
- Resolution 600 x 1200 dpi
- Emulation SPL. Windows, Linux and Mac 10.3
- 150 sheet paper tray
- Compact small footprint at only 5.5kgs
- Easy 4 click installation

T0775

\$219



NEW

PHOTO PRINTER

PHOTO PRINTER SPP-2040

- 2" LCD Screen
- 7 in 1 card reader
- USB 2.0 interface
- Direct PictBridge photo printing
- Optional Bluetooth wireless printing
- 2 year RTB warranty
- 6x4" photo printing

T3722

\$289



MONO LASER MFP

SCX-4216F

- 16ppm mono laser multifunction
- Printer/copier/fax/colour scanner
- Auto document feeder
- 33.6kbps fax
- Telstra Duet compatible
- 250 sheet tray
- Windows only
- USB & IEEE1284 connectivity

J2137

\$399



**Bonus
\$100
Gift
Voucher¹**

COLOUR LASER PRINTER

SAMSUNG CLP-510

- 6ppm colour/24ppm mono duplex laser
- Memory 64MB (Maximum 192MB)
- Resolution up to 1200 x 1200 dpi effective output
- Processor (CPU) Samsung SPGPm
- Emulation SPL-C (Samsung Printer Language Colour)
- 250 sheet tray, 100 sheet MPF, Windows only, USB 2.0
- 3 year onsite warranty

S2190

\$529

¹ Via redemption from Samsung. See samsung.ht.com.au for more details.

SAMSUNG TONERS

**SAMSUNG TONER FOR ML-1740
3000 PAGE YIELD
J2380 **\$99****

**SAMSUNG TONER FOR SCX-
4216F MFC MACHINE
J9653 **\$99****

**SAMSUNG CLP-510 7,000 PAGE
BLACK TONER CARTRIDGES
S2534 **\$159****

**SAMSUNG CLP-510 5,000 PAGE
CYAN TONER CARTRIDGE
S2536 **\$169****

**SAMSUNG CLP-510 5,000 PAGE
MAGENTA TONER CARTRIDGE
S2537 **\$169****

**SAMSUNG CLP-510 5,000 PAGE
YELLOW CARTRIDGE
S2538 **\$169****

**SAMSUNG ML-2250 TONER 5000
PAGE YIELD
Q2002 **\$149****

**SAMSUNG ML-2010 3,000 PAGE
CARTRIDGE
T0776 **\$119****

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SONY®

SONY HANDYCAM

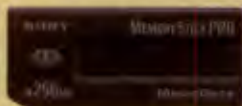
SONY 8CM DVD-RW DISC-DVD HANDYCAM

S7850 DMW30S2 1.4GB **\$10**

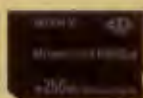
SONY 8CM DVD-R DISC-DVD HANDYCAM

T0840 DMR30S1 1.4GB **\$6**T0839 DMR60DSS1 2.8GB **\$9**

MEMORY STICK PRO

Q4432 MSX256S 256MB **\$90**Q4433 MSX512S 512MB **\$119**

MEMORY STICK PRO DUO

Q4033 MSXM256S 256MB **\$75**Q4035 MSXM512S 512MB **\$119**

*RENTSMART

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ENJOY THE CONVENIENCE OF INSTANT DVD HOME MOVIES!

- **Instant Review** - Instantly playback your footage on your DVD player, no transferring required.
- **Easy Editing** - You can edit footage directly on your DVD Handycam.

SONY DVD HANDYCAM



BONUS
Home DVD
Player!

DCRDVD602

- 20x Optical Zoom
- Zoom button & record start/stop on LCD
- 2.5" wide hybrid touch screen LCD

Rent* \$12.31/wk

S1319

**\$1,099**

SONY MINIDV HANDYCAM



DCRHC42

- 12x Optical Zoom
- 16:9 wide screen
- Handycam station supplied

Rent* \$13.20/wk

S1403

**\$1,178**

SONY DVD HANDYCAM



BONUS
Home DVD
Player!

DCRDVD703

- Carl Zeiss Vario-Tessar Lens
- Zoom button & record start/stop on LCD
- 2.7" wide hybrid touch screen LCD with True 16:9 Mega Screen Mode

Rent* \$15.68/wk

R9871

**\$1,399**

SONY HDV CAMCORDER



HDR-HCI

- HDV/DV compatible
- HDV recording format
- 10x optical zoom

Rent* \$29.36/wk

S8548

**\$2,791**

*Offer available from 01/01/06 to 15/01/06 for every purchase of a DVD Handycam. Via redemption from Sony, visit www.sony.com.au/freedvd for details.



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pinnacle
A division of Avid

harristechnology

Software

VIDEO PRODUCTS

FUSION HDTV PLUS (PCI)

Allows you to watch and record digital HDTV on your PC. It's also a video capture card that lets you capture analogue video into your computer for archiving your old VHS tapes onto DVD.



N9808

\$225

FUSION HDTV USB 2.0

Watch HD Quality Digital TV anywhere on your notebook or PC. Compatible with USB 2.0 BUS powered ports. Supports all Australian/European HDTV and SDTV formats.



Q7160

\$275

FUSION HDTV DVB-T DUAL DIGITAL

Two of your favorite TV programs are running at the same time. With the dual digital TV card, you can now watch your favorite channel while recording another or record both channels to watch later.



T3512



\$319

FUSION HDTV DVB-T HYBRID

Watch both Digital and Analog TV on your PC. The hybrid tuner supports both analog and digital receptions, so you can now watch all your favorite programs whatever the reception happens to be!



T3513



\$239

PINNACLE PCTV 310i



Pinnacle PCTV 310i is a complete, premium solution for turning your PC into a TV, PVR and entertainment center. PCTV 310i comes with software, a PCI TV tuner card and a remote control. The product includes a software MPEG-2 encoder, which offers full quality video capture. The components were designed and tested to offer a well-tuned, compatible product combination for an enjoyable experience.

T3514



\$195

STUDIO PRODUCTS

PINNACLE STUDIO 10

The most complete, powerful and easy-to-use home video editing software available today. Quickly combine and enhance your video and photos. Then effortlessly preserve and share your memories on DVD and the Web.



S8967 FULL

\$155

PINNACLE STUDIO 10 MEDIA SUITE

You get all the capabilities of Studio Plus v.10—and a suite of connected applications gives you the ultimate in control to manage, edit, preserve and share your video memories like a pro.



S9052

\$279

PINNACLE STUDIO 500

Pinnacle Studio 500 version 10 provides the ease and power to quickly combine and enhance your precious memories from camcorders to DVD.



Image of part 500-PCI

S9475

PCI



\$245

S9474

USB



\$319

PINNACLE STUDIO PLUS 700

Pinnacle Studio Plus 700 version 10 provides the ease and power to quickly combine, enhance, and instantly preview on TV, your videos from camcorders and share them on DVD.



Image of part 700-PCI

S9477

PCI

\$439

S9476

USB

\$489

PINNACLE PCTV 60E



Pinnacle TVCenter combines a high-quality TV viewing experience with advanced personal video recording features. Use our timeshifting technology to control live TV... fast-forward past commercials or instantly replay a scene. Pause the show you're watching and resume viewing later, exactly where you left off. It's easy to change channels with the included remote control.

T3515



\$185

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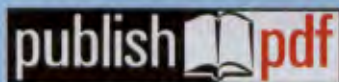
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These products are available for delivery only. Delivery charges apply. See page 63 for details

SOFTWARE

INTERNET SECURITY



PUBLISH PDF



PublishPDF™ software lets you save virtually any document (from Microsoft® Word™ documents to complex graphs) in the popular Portable Document Format (PDF). A PDF file preserves the format of the original document, and contains all the original fonts, images and graphic information, layout and formatting – so what you see is exactly what everyone else sees.

J6097 FULL **\$85**
L8155 ACADEMIC **\$45**

ZONEALARM INTERNET SECURITY SUITE 6



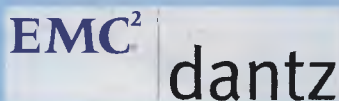
Get easy-to-use, comprehensive protection against hackers, spyware, worms, identity thieves, spam and much more. With 12 months of updates and support it is perfect for the home user.

- AntiSpyware and email security
- ID/Privacy protection and parental control
- Triple defense firewall and IM protection
- Wireless PC protection and spam and publishing blockers
- Antivirus protection
- Chat securely online with Instant Messaging security
- Install one application to look after all of your electronic security concerns
- Save time sorting through emails with the spam filtering feature
- Get rid of the rubbish - filter malicious websites
- Protect your computer effortlessly from hackers, trojans and spyware with Zone Labs proven stealth firewall against inbound and outbound attacks

S9405

\$9

EMC DANTZ RETROSPECT BACKUP



ADD-ON PRODUCTS:

- EXCHANGE SERVER AGENT
- SQL SERVER AGENT
- ADVANCED TAPE SUPPORT
- OPEN FILE BACKUP
- DISASTER RECOVERY
- ADD-ON VALUE PACK (includes all 5 add-ons)

*CALL 1300 13 9999
FOR LATEST PRICING

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EMC Dantz® Retrospect® 7 for Windows provides complete protection for file servers, desktops, notebooks and business-critical applications.

RETROSPECT PROFESSIONAL - Designed for home and small office users who want to protect a single Windows computer and up to two additional networked Windows, Macintosh or Linux desktops and laptops.

RETROSPECT DISK-TO-DISK - Backup and restore a single Windows server to disk, CD or DVD.

RETROSPECT SINGLE SERVER - Designed for small or mid size businesses with a single Windows server. Runs on Windows server and includes unlimited client licenses to protect networked desktops and laptops running Windows, Mac, Linux, Novell Netware and Solaris.

RETROSPECT SMALL BUSINESS SERVER - Backup and restore a single Windows Small Business Server, well as networked desktops and laptops running Windows, Mac, Linux, Novell Netware and Solaris.

Standard Edition includes an Exchange Server Agent and Disaster Recovery for the server while the Premium Edition includes all the above plus an SQL Server Agent.

RETROSPECT MULTI SERVER - Ideal for a network with multiple Windows servers. Also includes unlimited client licenses to protect networked servers, desktops and laptops running Windows, Mac, Linux, Netware and Solaris.

R4121 PROFESSIONAL 7.0 **\$199**R4126 DISK-TO-DISK 7.0 **\$454**R4122 SINGLE SERVER 7.0 **\$1,059**

These products are for delivery only. Delivery charges apply. See page 63 for details.

SOFTWARE

SCANSOFT'S PRODUCTIVITY APPLICATIONS

DRAGON NATURALLY SPEAKING 8® PREFERRED & STANDARD EDITIONS

Dragon NaturallySpeaking 8 is the fast, easy and accurate way to convert talk into text. Create documents, spreadsheets and e-mail - all by speaking! Talk to your computer and your words instantly and accurately appear in Microsoft® Word and Excel®, Corel® WordPerfect® and virtually all Windows®-based applications. Listen to incoming e-mail and documents read aloud. Search the Web by speaking URLs and links.

Specially designed for Australian speech, Dragon NaturallySpeaking 8 is more accurate than ever before. Achieve outstanding accuracy levels of up to 99%.

Dragon NaturallySpeaking learns to recognise your voice in fewer than five minutes, and gets better the more you use it!



Q3826 STANDARD EDITION **\$179**

Q3827 PREFERRED EDITION¹ **\$389**

¹Via redemption from ScanSoft. Redemption offer also valid with purchases of PaperPort 10 and PaperPort Professional 10. See scansoft.ht.com.au for details. Bonus is only available with Dragon NaturallySpeaking 8 Preferred edition.

OMNIPAGE PROFESSIONAL 15



OmniPage Professional 15 is the most accurate document conversion available, turning paper and PDF files into electronic files you can edit, search and share. New OCR engines and precise analysis of page layout ensure that your electronic documents look exactly like the original - complete with text, graphics, columns and tables.

S8698 **\$849**

TOTAL TRAINING SOFTWARE

TOTAL TRAINING FOR ADOBE ACROBAT 7 PROFESSIONAL



Master the most powerful document management software with Total Training For Adobe® Acrobat® Professional. We unveil the software's many capabilities to simplify sharing spreadsheets, presentations, brochures, and graphics across different hardware and software platforms.

T0729 **\$259**

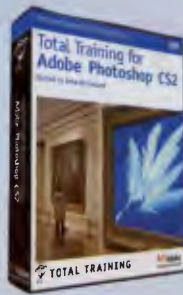
TOTAL TRAINING FOR ADOBE CREATIVE SUITE 2 STANDARD



Expand your creative potential with Total Training's Adobe Creative Suite 2 Standard Bundle. This incredible collection of training products delivers in-depth lessons on each of the powerful programs offered in the Standard version of Adobe's Creative Suite.

T0739 **\$905**

TOTAL TRAINING FOR ADOBE PHOTOSHOP CS2



Discover all Photoshop has to offer with this Masters Collection Series of video-based training. The comprehensive lessons are geared for power users of Photoshop CS2 with valuable techniques and advanced lessons reserved for this series only.

S3317 **\$399**

TOTAL TRAINING FOR ADOBE GOLIVE CS2



These comprehensive videos presented by Lynn Grillo, an Adobe Certified Expert, will move your knowledge of Web development up a notch with intuitive visual lessons and tutorials. You'll learn how to create stunning web pages that are visually effective on a computer screen or a hand-held device.

T0743 **\$139**

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2006 VERSIONS

**HURRY OFFER ENDS
16 JANUARY 2006**
**SWISSBIT TWIST
256MB USB DRIVE
WITH PURCHASE
OF SELECTED
PRODUCTS**


This Christmas we're offering you a **BONUS Swissbit Twist 256MB USB drive** valued at over \$60. The drive will be available via mail-in redemption from Symantec for retail purchases of:

- The Freedom Bundle: Norton Internet Security 2006 and Norton SystemWorks 2006 Premier – free yourself from viruses and worms, spyware, spam, phishing, hackers and other net predators, data loss, and more
- Norton Internet Security 2006 (single or 3-user pack)

Terms and Conditions

¹ Buy Norton Internet Security 2006 (single or 3-user pack) OR the Freedom Bundle and receive a **BONUS Swissbit Twist 256MB USB Drive** valued at over \$60 via mail-in redemption to Symantec. **Offer only valid til 16 January 2006** See symantec.ht.com.au or box for mailing details.

PLEASE NOTE:

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NORTON INTERNET SECURITY™ 2006 & GHOST 10.0 BUNDLE

Enjoy your connection to the world **PLUS** save the things you care about. Norton Internet Security 2006 protects your computer from viruses, hackers, spyware and spam with comprehensive security. While with Norton Ghost 10.0 you can back-up everything on your computer - from digital photos to your valuable music collection.

Save the stuff you care about with the new Norton Ghost. From photos and music to tax documents, Norton Ghost 10.0 automatically backs up and recovers everything on your computer. Reliable, efficient, and versatile, Norton Ghost optimises backup space, works with a wide range of media devices, and brings back your entire system in a few short steps.

T0833 BUNDLE PRICE

\$139
NORTON INTERNET SECURITY™ 2006 & SYSTEMWORKS PREMIER 2006 BUNDLE

The ultimate PC protection pack: combines Norton Internet Security 2006 and Norton SystemWorks 2006 Premier to free your computer from viruses, worms, spyware and spam, protect against phishing and hackers **PLUS** gives you the tools to optimise your computer experience and back up your important files.

Optimise your computer experience with Norton SystemWorks 2006 Premier. This powerful solution offers advanced protection, automatically backing up everything on your computer. It also prevents many problems, keeping your computer healthy and protected against viruses and dangerous spyware. And when trouble does occur, it's there to help you repair and recover.

Offer only valid til 16 January 2006.

T0834 BUNDLE PRICE

\$179
NORTON INTERNET SECURITY™ 2006

Enjoy your connection to the world. Norton Internet Security™ 2006 gives you the confidence to travel the Internet like never before. A comprehensive set of award-winning tools, Norton Internet Security automatically blocks hackers, viruses, and spyware. It filters out phishing email and spam, while its privacy and parental controls protect your personal information and shield your children from harm. And should your operating system or browser have a security hole, Norton Internet Security is there to handle resulting attacks. With all these tools working for you, you're free to get connected, stay connected, and use the Internet however you want.

Offer only valid til 16 January 2006.

T0683 SINGLE USER **\$115**

T0690 3 USER

\$179

Quicken

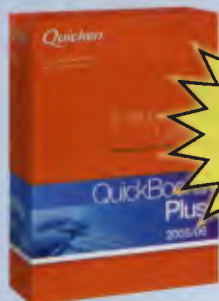
harristechnology



Software

QUICKEN BONUS OFFER

QUICKBOOKS PLUS 2005/06



**\$150
Cash
Back¹**

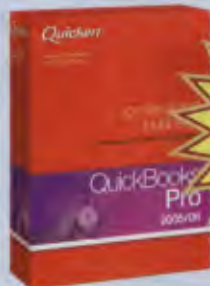
QuickBooks Plus 2005/06 is perfect for small business with employees - it includes integrated payroll and inventory management.

Track GST, help prepare BAS and lodge it online
Comprehensive payroll & employee management
Access over 100 types of reports and graphs
Includes 12 months technical support and upgrades[^]

R9291

\$449

QUICKBOOKS PRO 2005/06



**\$200
Cash
Back¹**

QuickBooks Pro 2005/06 has all the tools for a professional business. Includes integration with Microsoft Office with designed templates, estimates and job costing - to see which projects are making money.

- Included functions of Time Tracking, Estimates, Quotes & Job Costing
- Comprehensive payroll & employee management
- Includes 12 months technical support and upgrades[^]

R9292

\$625

QUICKEN HOME & BUSINESS 2005/06



**Bonus
copy of Home
& Business &
256MB
USB²**

Quicken Home & Business 2005/06 combines the best of investing and basic business cash flow management to assist you in combining your personal and business finances, allowing you to obtain a complete picture of your financial wealth.

- Track your personal & business bank accounts, credit cards, income & expenses
- Help manage your investments and superannuation

S9581 FULL

\$369

QUICKBOOKS PREMIER 2005/06



**\$500
Cash
Back¹**

The multi user solution - QuickBooks Premier is for 2 to 5 users, and has industry-specific editions tailored to your needs.

Multi user for between 2-5 installations
Industry specific editions for ease of use
Microsoft Office integration with QuickBooks Premier 2005/06
Comprehensive payroll and employee management
Includes 12 months technical support and upgrades[^]

R9294

\$1,520

RETAIL STARTER KIT 2005/06



**Scanner,
Receipt
Printer & Cash
Drawer²
Via Redemption**

Retail Starter Kit 2005/06 is retail intelligence at your fingertips. Your kit includes a copy of QuickBooks Point of Sale 2005/06 and QuickBooks Plus 2005/06 to track all your sales, inventory, purchase orders, customers and accounting for a complete retail solution. **Includes Scanner, thermal printer, cash drawer and 12 months technical support and updates[^]. Via Redemption from Quicken. Please allow up to 30 days for items to be received.**

S8318

\$825

TERMS & CONDITIONS

1. The promotion applies only to customers who purchase the full version of QuickBooks Plus 2005/06, QuickBooks Pro 2005/06 and QuickBooks Premier 2005/06 between **16th January and 19th March 2006**. You must also register your product with Quicken before 5 April 2006 to qualify for the offer. For more information see back of redemption stickers or go online to **quicken.ht.com.au**
2. Scanner thermal printer and cash drawer available by redemption from Quicken. Picture for illustration purposes only. See box for details.
3. Bonus copy of licence is CD only, offer available from 1 November 2005 till 28 February 2006 by redemption from Quicken. Terms & conditions apply **www.quicken.com.au/promotions**

[^] Normal Advantage terms and conditions apply.

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EFFORTLESSLY MANAGES ALL YOUR INFORMATION

**FILEMAKER PRO 8
ADVANCED**

FileMaker Pro 8 Advanced replaces FileMaker Developer and has all the features of FileMaker Pro 8 plus advanced development and customisation tools so you can efficiently build more powerful, more customised databases!

**SPECIAL OFFER**

For a limited time only, FileMaker Pro 6, 7 and 8 customers are eligible to upgrade to FileMaker Pro 8 Advanced until June 30, 2006. For further information please go to www.filemaker.com.au/promos

**SPECIAL OFFER
FILEMAKER SERVER
UPGRADE**

Upgrade to FileMaker Server 8 from FileMaker Server 5.5 or FileMaker Server 6 for \$1,049 direct from FileMaker. This offer is valid until 30 June, 2006. For further details go to www.filemaker.com.au/promos

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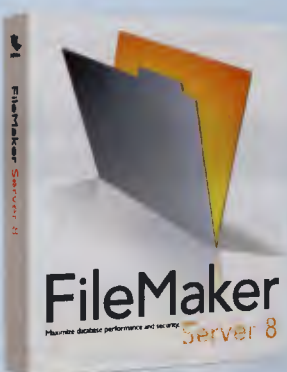
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WORK FASTER. SHARE MORE.**

FileMaker Pro 8 is the best FileMaker ever! Work significantly faster and share information with more people and programs than ever before with the exciting new FileMaker upgrade. It includes breakthroughs in sharing with Adobe Acrobat and Microsoft Office, as well as new features designed to help you work faster every day.

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S8597

\$459**FILEMAKER SERVER 8 - NOW AVAILABLE**

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- Increase security
- Automate backups

Learn more at <http://www.filemaker.com.au/products/fms>

T0640

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FileMaker Mobile 8 is a companion to FileMaker Pro 8, designed specifically for Palm OS and Pocket PC handhelds, so you can easily extend your FileMaker solutions beyond your desktop to mobile individuals and workgroups.

With its ability to transfer just the data you want to one or more handhelds from standalone or shared databases, flexible data entry and viewing features, and two-way synchronisation, FileMaker Mobile provides everything you need to:

- Have information at your fingertips
- Easily manage information while on the go
- Keep your mobile workgroup in sync

T3838

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2006



AutoCAD LT
2006



AUTODESK®
DWF™ COMPOSER



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S0481 FULL



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AutoSketch 9 provides: • Comprehensive CAD tools for creating expert-quality drawings • Straightforward drafting in a Windows XP-like environment • Tutorials and wizards for a fast start.

P7266

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ARCHITECTURAL

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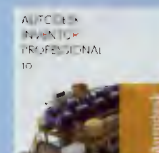
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33466 **\$5**

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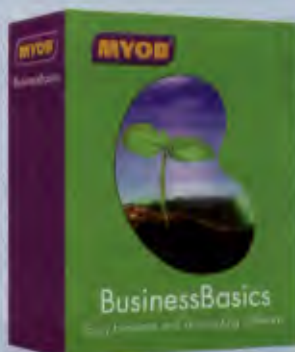
MYOB ACCOUNTING PLUS 15 WITH COVER



MYOB Accounting Plus with Cover includes all the great features of Accounting Plus (see left) and a 12 month subscription to MYOB Cover – an essential support package gives you the software, support and services needed to keep your business operating efficiently and profitably.

S9257 FULL **\$765**

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G4153 **\$139**

MYOB ACCOUNTING 15

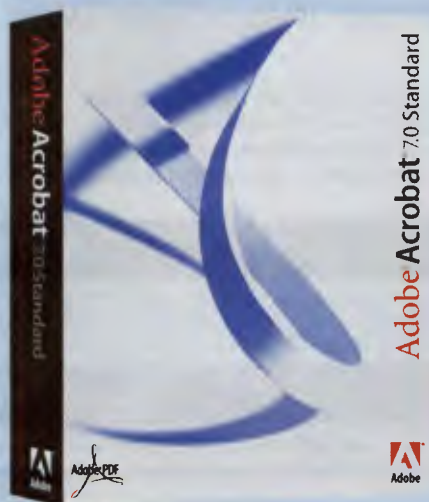


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Q7824 WIN

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T0696

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T3377



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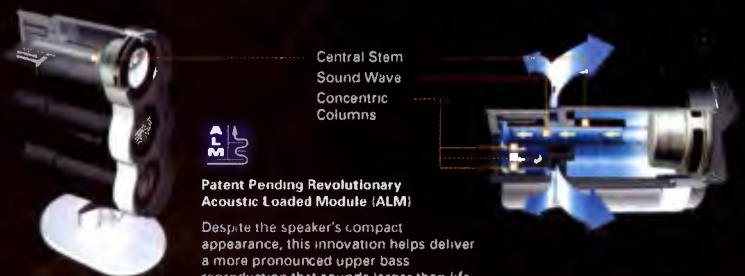
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